



Southern Wood Piedmont Company

RCRA PART B POST-CLOSURE PERMIT RENEWAL APPLICATION FOR SWP - CHATTANOOGA, TENNESSEE SITE

VOLUME I – TEXT, TABLES, AND FIGURES

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Southern Wood Piedmont Company

May 31, 2001

Tennessee Department of Environment & Conservation Division of Solid Waste Management Fifth Floor, L&C Tower 401 Church Street Nashville, TN 37243-1535

Attn: Mr. Clayton Bullington

Re: RCRA Part B Permit Renewal Application

Southern Wood Piedmont Company

Chattanooga, Tennessee

Hazardous Waste Facility Permit TN HW-078

Dear Mr. Bullington:

Enclosed are two copies of the RCRA Part B Permit Renewal Application for post-closure care and ground-water corrective action at the Southern Wood Piedmont — Chattanooga, Tennessee facility. This renewal application is being submitted in accordance with Standard Condition I.D.2. and Tennessee Rule 1200-1-11-.07(2)(e).

We look forward to receipt of your approval of the RCRA Part B Permit Renewal Application. Should you have any questions, please call me at 864/599-1070, extension 111, or you can reach me at the address above.

Sandra B. Watson

Manager of Environmental Affairs/Data Management

CC: M. D. Pruett

W. P. Arrants J. L. Hudson S. E. Blevins

Narindar Kumar, Chief, USEPA Reg. IV, Waste Mgmt. Div.

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1.0 GENERAL INFORMATION

This Post Closure Renewal Application is required by State and Federal regulations for any properly closed hazardous waste management facility. This section provides location information, site hydrogeology, previous wood treating operations within the plant site, regulatory history, security procedures and equipment, inspection schedule, and a justification for Waiver of Preparedness and Prevention Requirements.

1.1 LOCATION, TOPOGRAPHY, AND CLIMATE

Southern Wood Piedmont Company (SWP-Chattanooga) is located at 400E 33rd Street, Chattanooga, Tennessee, 37401. The mailing address for correspondence regarding this renewal application is:

Southern Wood Piedmont Company P. O. Box 5447 Spartanburg, South Carolina 29304

The Chattanooga Site is located in an urban/industrial area of southern Chattanooga. It is a closed treatment storage and disposal (TSD) site. The former plant site is bounded by the following features:

- To the northwest is an industrial/commercial area including a trucking distribution center, an equipment rental business and other businesses;
- A shipping company to the immediate southwest;
- A city landfill and federal housing community to the south of the former plant site; and
- Chattanooga Creek to the east.

Maps developed to meet the general topographic map requirements specified in 40 CFR 270.14(b)(19) are provided as Figures 1-1 through 1-5. These maps show the property boundary, the closed surface impoundment and waste management area (WMA) boundary, plus other required details. Figure 1-5 is a wind rose for the area.

The combination of Figures 1-1 through 1-5 provides the information required by 40 CFR 270.14(b)(19). The following information is provided:

- 1. Scale 1 inch = 200 feet (Figure 1-1)
- 2. Contours sufficient to show surface water flow (Figure 1-1)
- 3. Extend 1000 ft beyond property (Figure 1-2)
- 4. Map scale (all figures)
- 5. Map date (all figures)
- 6. 100-yr floodplain (Figure 1-4)
- 7. Surface waters (Figures 1-1 and 1-2)
- 8. Surrounding land use (Figure 1-2)
- 9. Wind rose (Figure 1-5)
- 10. Map orientation (all figures)
- 11. Legal boundaries (Figures 1-1 and 1-2)
- 12. Location of access control (Figure 1-1)
- 13. Injection and withdrawal wells
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- 14. Buildings (Figure 1-1)
- 15. Structures (Figure 1-1)
- 16. Sewers (Figure 1-1)
- 17. Loading and unloading areas (Figure 1-1)
- 18. Fire control facilities (Figure 1-1)
- 19. Flood control or drainage barriers (Figure 1-3)
- 20. Run-off control systems for HWMU (Figure 1-3)
- 21. Location of hazardous waste units (Figure 1-1)
- 22. Location of solid waste management units (Figure 1-1)
- 23. Access and internal roads (Figure 1-1)

Figures 1-1, 1-2, 1-9, 1-11, 1-12, 3-4, and 3-5 combine to provide the additional following information:

- 1. Ground-water flow direction and estimated rate (Figures 1-11 and 1-12).
- 2. Delineation of the point of compliance (Figure 1-1).
- 3. On-site and off-site ground-water monitoring wells and recovery wells (Figures 1-1).
- 4. Delineation of the extent of the plume (Figures 3-4 and 3-5)
- 5. Delineation of waste management area boundary (Figure 1-1).
- 6. Delineation of property boundary (Figures 1-1 and 1-2).
- 7. Locations of uppermost aquifer and aquifers hydraulically inter-connected beneath the facility (Figure 1-9).

Additional information on ground-water flow, aquifer definition, plume descriptions, etc. is discussed in Sections 1.2 and 3.1.

1.2 SITE HYDROGEOLOGY AND GROUND-WATER USE

1.2.1 Hydrogeology

The SWP site is located within the Valley and Ridge Physiographic Province near the boundary with the Appalachian Plateau Physiographic Province. The Valley and Ridge Province is characterized by numerous northeast-southwest trending elongated valleys and ridges composed of sedimentary rocks, predominantly limestone, shale and sandstone which were formed during the Paleozoic era, 230 to 600 million years ago. Ridges are formed of resistant layers of sandstone while the valleys are underlain by more erodible limestone and shale. The rocks of the Valley and Ridge Province are typically folded into elongated anticlines and synclines that have been subject to faulting and have moderate to steep angles of dip.

The bedrock underlying the site belongs to the Lower-to-Middle Chickamauga Supergroup of the Ordovician period (formed 430 to 500 million years ago). Figure 1-6 shows the regional geology of the area. Specifically, the bedrock at the site is mapped as the Stones River Group and consists primarily of limestone with interbeds of shales, mudstones, and bentonite. This is determined by correlation between the drilling results and geologic maps (Rodgers, 1953), outcrops described in the literature (Wilson, 1979) and local geologic knowledge (Dafferner, 1988), and by comparison with drilling cores of known lithologies stored by the Tennessee Division of Geology. It is estimated that the Stones River Group ("Chickamauga limestone") is well over 1000 feet thick beneath the western site boundary and about 600 feet thick near Chattanooga Creek. Chickamauga limestone is underlain by the Knox Group (predominantly dolomite) of Cambrian to early Ordovician age (formed about 500 to 600 million years ago). Borings about 100 feet deep along Chattanooga Creek did not encounter the next lower geologic unit, the Knox dolomite.

As part of the "Dye Tracer Study Report, Velsicol Chemical Corporation Facility", Quinlan and Associates, Crawford and Associates, and Law Engineering and Environmental Services (1994 through 1997) performed a very detailed inventory of ground water and surface water for the entire section of the Chattanooga Creek from the Tennessee/Georgia state line to the Creek's confluence with the Tennessee River. This study showed that, in the wide area that could potentially be impacted by the SWP site, there are none of the features usually associated with well-developed limestone (karst) aquifers. The study did not find any sinkholes, sinking streams, caves or springs flowing from bedrock conduits (LAW with Crawford and Associates, Inc., 1997). The study area has surface streams, seeps, ponds and swamps, all

indicative of a high water table and poor subsurface drainage. Also similarly to the SWP site conditions, the water table in most of the monitoring wells at the Velsicol site (located upstream from the SWP site) indicate slow drainage in the underlying bedrock. Therefore, the Velsicol study and the data collected at the SWP site, which is situated nearby in very similar geologic conditions, confirm that there is no evidence of karst features or a karstic aquifer in the study area.

Over 150 soil and rock borings and 25 test-pit excavations have been performed at the SWP site as part of the overall site assessment (SWP, 1988, 1990). Soils at the site consist primarily of residual material (sandy clay) with man-made fill present within portions of the former main plant area and alluvial deposits of the Chattanooga Creek floodplain. The alluvial deposits consist of clay, silt, sand and gravel. Residual soil at the site is 10 to 40 feet thick as shown on Figure 1-7. Figure 1-8 illustrates the soil/bedrock interface (top of rock) at the SWP site, and Figure 1-9 provides an east to west cross section of the site.

For the purposes of assessment and corrective action, the uppermost aquifer beneath the former Southern Wood Piedmont facility is herein defined as the zone in which a significant amount of water can generally be withdrawn and beneath which a significant reduction in the hydraulic conductivity and yield occurs. This uppermost aquifer is comprised of two interconnected ground-water-bearing zones. These zones are the soil water-bearing zone and the underlying weathered and highly fractured rock water-bearing zone.

The soil water-bearing zone is comprised primarily of residual sandy clays that result from the in-place weathering of the parent rock underlying the site. Alluvial soils comprised of clays, silts, sands and gravels were encountered in the Chattanooga Creek floodplain and are considered part of the soil water-bearing zone. Thirty-five monitoring wells have been screened within the soil water-bearing zone. In-situ hydraulic conductivity tests were performed in 12 of these wells using slug tests methods. Coefficients of hydraulic conductivity (horizontal) within this zone ranged from 2 x 10⁻³ cm/sec to 1 x 10⁻⁶ cm/sec.

Comparison of ground-water elevations measured in 19 residual soil monitoring wells with those of the adjacent bedrock monitoring wells indicates a general downward flow from soil to rock. An upward flow gradient from rock to soil is apparent near the southeastern portion of the plant in and adjacent to the swamp (monitoring wells L-1A, L-2A, and C-5A) and around the northwestern limits of the Waste Management Area near the closed K001 pond (monitoring wells WQ-5 and WL-1).

Ground-water flow in both the residual soil and bedrock water-bearing zones beneath the Waste Management Area flows toward Chattanooga Creek from a potentiometric high near the western property corner (Figures 1-11 to 1-12). Ground water flowing beneath the central and southern portion of the site discharges to a topographic low area in the swampy portion of the plant, south and west of the CERCLA pond, and ultimately this discharged ground water reaches the Chattanooga Creek. Ground water flowing beneath the northern portion of the Waste Management Area (north of the drip track and treating room) discharges into Chattanooga Creek along the property line north of ponds 2A and 2B.

Based on extensive hydrogeologic investigation; including drilling, coring and logging of 56 boreholes. hydraulic testing, monitoring well installation, and consistent measuring of ground-water levels, the rock beneath the site can be generally categorized by two hydraulic conductivity zones. The upper portion of rock (immediately below the residual soil - see Figure 1-8 for contours of top of rock) is more fractured and weathered, has higher permeability for ground-water flow and therefore constitutes the rock aquifer at the site. Hydraulic conductivity is typically above 1 x 10⁻⁵ cm/sec. Fracture zones within the rock aquifer (i.e., severely fractured and weathered rock with no core recovery logged as "voids" and/or "cavities" during rock coring) were also field tested at the site and yielded values of hydraulic conductivity between 1 x 10⁻³ and 1.6 x 10⁻⁴ cm/sec (locations C-21A, P-4, P-11, P-12, and U-4A - SWP 1990). Within this upper severely fractured and weathered limestone, where the limestone could be dissolved by circulating ground water (such as along larger fractures), the fractures have most likely collapsed and infilled so that the formation of extensive or connected cavities has not occurred. This "collapse" mechanism is indicated at the site both by the tested hydraulic conductivity (10⁻³ to 10⁻⁴ cm/sec range) across zones of logged "voids" and by the ability to fill one borehole within a logged "cavity" with a relatively small quantity (about 44 ft³) of cement grout (abandoned borehole C-22A) adjacent to another borehole with core loss zones in rock logged as cavities (well C-22B).

The bottom of the uppermost aquifer is defined as the low hydraulic conductivity rock (less than 1 x 10⁻⁵ cm/sec) present beneath the fractured rock zone. At depths of 60 to 80 feet below the land surface, the hydraulic conductivity of the rock generally drops to less than 1 x 10⁻⁷ cm/sec indicating the bottom of the rock aquifer. This value is comparable to that of clay sediments that are commonly considered "confining units" due to their lack of ability to effectively transmit fluids. The absence of significant ground-water circulation in the deeper rock at the site is evidenced by deep monitoring wells (e.g., C-31B, C-29B and L-4E) that repeatedly cannot be sampled due to the lack of water (SWP, 1997). The deeper portion of the Stones River Group underlying the site exhibit low hydraulic conductivity because

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the formation is made up of thinly bedded limestone interbedded with low permeable shales, mudstones and bentonite (Luther, 1979; Rodgers, 1953; Wilson, 1979a).

Ground-water flow in rock at the site is directed toward the ground-water intercept trench by its operation (i.e., pumping water from the trench). The portion of the site affected by pumping from this trench has curved equipotential lines and the corresponding flow lines (arrows) show flow direction toward the trench (see Figures 1-11 and 1-12). The map on Figure 1-12 is constructed from data collected in monitoring wells completed in the rock aquifer. The hydraulic heads in the rock aquifer are affected by the trench during both high and low flow conditions as shown by the equipotential lines in Figure 1-10. The trench was installed by SWP near Chattanooga Creek, which was the natural discharge line for the rock aquifer beneath the site before installation of the trench.

Ground-water flow velocities were estimated for the May and October 2000 data in both the residual soil and limestone water bearing zones using the Darcy Equation:

V = ki/n

Where, V = Ground-water velocity (ft/yr)

k = Hydraulic Conductivity

(83 ft/yr in soil, 103 ft/yr in fractured limestone)

i = Hydraulic Gradient (soil: 0.008 to 0.04 ft/ft,

fractured limestone: 0.008 to 0.05 ft/ft)

 n_e = Effective porosity (0.10 in soil, 0.05 in fractured

limestone)

A range of ground-water flow velocities was estimated for each water bearing zone in both the former plant and flood plain areas of the site. Estimated maximum velocities in the residual soil zone are approximately 6 ft/yr (May 2000) in the flood plain and 33 ft/yr (October 2000) in the former plant area, outside of the area of drawdown near the recovery/intercept trenches. Estimated maximum velocities in the limestone water bearing zone are approximately 25 ft/yr (May 2000) in the flood plain (outside of the area of drawdown near the ground-water intercept trench) and 99 ft/yr (May 2000) in the former plant area. These velocities are in the range with previous estimates of flow velocities in these two hydrologic units at the site.

Ground-water flow in the low hydraulic conductivity rock (LHCR) zone is not considered to be significant. This insignificance continues to be supported by the presence of no or very low recharge into several monitoring wells with open hole segments intersecting the LHCR (wells C-2A, C-29B, C-31B and L-4E) and previous field testing that indicated the zone is relatively impermeable. The only ground water detected during previous drilling within the LHCR exists in occasional fractures within the rock.

1.2.2 Ground-Water Use

The site area is located within the Tennessee-American Water Company Utility District. Water is supplied from wells located on the floodplain of the Tennessee River (Wilson, 1979b). Known wells in the site area are shown in Figure 1-13. These are primarily used for industrial purposes.

Out of the twelve wells drilled into the Lower to Middle Ordovician in Chattanooga (DeBuchananne and Richardson, 1953), four reported difficulties either with amounts of available water or water quality. Two wells reported a 160 foot drawdown after 10 and 30 minutes of pumping at 55 gallons per minute (gpm). The wells which exhibited large drawdowns were generally over 100 feet deep, some as much as 400 feet deep. One well, drilled 613 feet bgs, encountered no appreciable amounts of water below 50 feet.

The geologic unit beneath the Chickamauga is the Cambrian-Lower Ordovician Knox Dolomite. The Knox is stratigraphically separated from the Chickamauga by a regional unconformity. The Knox, where it crops out, is considered a good aquifer. The Knox has not been observed at the site, but may exist near the surface on the eastern side of the Chattanooga Fault. The Knox weathers into a cherty soil and is typically associated with the Fullerton soil series. This soil, mapped near the National Cemetery in Chattanooga (northeast of the site), indicates the location at which the Knox plunges underground along the axis of an anticline. A small area of Fullerton soil is also mapped to the southeast of the site. One well to the southeast of the site may yield water from the Knox (Stannard, 1988).

1.3 PREVIOUS OPERATIONS AT THE SITE

Wood treatment, storage, and wastewater treatment operations occurred at the SWP site between 1924 and 1988. The treating plant was located on a 77-acre fenced site along the west side of Chattanooga Creek. The former wood treating plant engaged in the treatment of railroad crossties with creosote. The wood, before creosote treating, was dried by natural air seasoning or artificial means. The artificial drying

included steaming within the process cylinder, boultonizing, and vapor drying. After drying, the wood was pressure treated with creosote preservative and either shipped to the customer or stored on the plant site until sold.

In 1988, all structures (with the exception of a shop/office, above ground storage tank and ground-water treatment plant) were demolished and removed from the property and areas of visual surface contamination were removed. Parts of the site were regraded and a grass cover established. Since 1988, two remediation systems have been installed. These remediation systems include a ground-water/dense, non-aqueous phase liquid (DNAPL) recovery trench beneath the former drip track and a ground-water intercept trench downgradient of the former plant site, adjacent to Chattanooga Creek.

In 1986 and 1989, SWP acquired additional property adjacent to the plant and to the east of Chattanooga Creek so that the entire SWP property, including the 77-acre RCRA site, is now 155 acres.

1.3.1 Wastewater Generation

Potable city water was used by the wood treating plant for boiler steam generation, general housekeeping and sanitary uses. Water was also derived from processes such as steam seasoning the wood prior to chemical treatment, collected rainwater from the central processing area, and waste steam. The above water ultimately required treatment before discharging to the POTW as it was unavoidably in contact with equipment used in the chemical wood treating process and as a result became contaminated with small quantities of wood treating chemical residues (creosote).

The plant process waters were collected and piped directly to two oil/water separators in series. This allowed creosote recovery and recycling to the wood preserving operation.

From the exit of the #2 oil settling basin, wastewater was pumped to an aerated surface impoundment holding pond (pond 3A) for extended mechanical aeration. This unit consists of an irregular shaped surface impoundment designed for the treatment of wastewater. This area was the only area where hazardous waste was generated or stored by SWP-Chattanooga. The unit had no dikes but was constructed as an excavated depression. It had a perimeter of approximately 800 feet and a designed water capacity of 1.10 million gallons.

The surface impoundment provided sufficient residence time to allow settling of organics and solids. The plants wastewater was then processed through a new oil/water separator and then pre-treated by a Wemco induced air flotation unit. With the aid of this unit and chemical flocculents, the plants wastewater was treated to meet POTW pretreatment standards. The solids generated by this pretreatment process were returned to the wood treating process. No hazardous wastes were generated. Water from the surface impoundment was sent to the Chattanooga POTW by pumping into the sewer connection at the west end of the surface impoundment.

1.3.2 Hazardous Waste Generation

The treatment of wastewater within the surface impoundment produced an US EPA listed Hazardous Waste "K001," defined as a bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. This K001 sludge was generated and stored in the wastewater treatment surface impoundment. The K001 was not handled until the impoundment was removed from service. Prior to closure (backfilling and capping) of the unit, the K001 waste sludge and visually contaminated soil were removed and disposed at a permitted hazardous waste disposal facility.

Both oil/water separators and the surface impoundment were removed from service and closed in 1987.

1.4 REGULATORY HISTORY

1.4.1 Regulated Unit

The SWP Chattanooga wood treatment facility filed a Part A Permit Application on November 19, 1980. On May 23, 1984, SWP submitted a RCRA Part B permit application for the regulated unit. The application was revised and resubmitted on November 7, 1985, December 21, 1987, and December 2, 1988. On December 3, 1984, the USEPA Region IV issued a Complaint and Compliance Order to SWP. On June 6, 1985, the USEPA issued a second Compliant and Compliance Order to SWP based on a 5/8/85 inspection and compliance evaluation which alleged a violation of lack of a ground-water quality monitoring plan and lack of properly documented personnel training. SWP prepared a Report of Ground-Water Quality Assessment to respond to the Order and submitted the document on October 14, 1986.

SWP submitted a plan to the Tennessee Department of Environment and Conservation (TDEC) to close the hazardous waste management unit on October 26, 1986. The facility was closed under the approved plan and a Closure Certification Report was submitted to TDEC on September 10, 1987. On January 29, 1988, TDEC notified SWP that its Closure Certification satisfied all applicable requirements under Tennessee law.

SWP resubmitted the Part B application to the TDEC on July 9, 1990. TDEC issued a public notice and a draft post-closure hazardous waste management permit to SWP on August 6, 1991. The final Post-Closure permit for the Chattanooga facility was issued by TDEC on September 30, 1991. On October 31, 1991, SWP filed a petition with TDEC challenging the Post-Closure Permit.

1.4.2 HSWA Permit

Twenty-eight areas of potential releases of hazardous constituents (solid waste management units) were reviewed at the site by TDEC during a May 28, 1987 RCRA Facility Assessment. Of these twenty-eight units investigated (as described in TDEC's July 22, 1987 RCRA Facility Assessment); sixteen, including the wood treatment vessel, were identified as requiring continued ground-water monitoring or further study to verify presence or absence of releases. The wood treatment vessel, recommended for air monitoring, was removed during plant demolition.

On August 12, 1991, the USEPA issued a draft permit for the facility pursuant to the Hazardous and Solid Waste Amendments (HSWA) of 1984. SWP submitted extensive comments on the HSWA Permit to the USEPA on September 23, 1991. The final HSWA Permit was issued by the USEPA, Region IV, on September 30, 1991. SWP submitted HSWA Permit Appeal No. 91-24 on October 29, 1991. In this appeal SWP indicated that significant assessment and remediation activities had been conducted at the SWMUs identified in the permit as requiring a RFI Workplan. SWP requested that this information be used rather than conducting additional assessment activities. On March 25, 1993, the USEPA issued a Consent Agreement and HSWA Permit No. TND 003 327 400 that identified 12 SWMUs for confirmatory sampling, 4 SWMUs requiring a RCRA Facility Investigation Work Plan, 8 SWMUs requiring no further action, and 1 SWMU (SWMU No. 5) that would be handled under the State RCRA permit. In comments received from the USEPA dated May 14, 1993, two additional Wood Handling Areas where identified as requiring confirmatory sampling.

SWP performed confirmatory soil sampling at 16 SWMUs and ground-water sampling at SWMUs 3 and 4. On May 10, 1994, SWP issued a Confirmatory Sampling Report describing results of the confirmatory sampling.

In 1999, a Settlement Agreement was reached that detailed alternatives to the RFI Workplan including a baseline ground-water sampling event, submittal of maps providing the hydrogeologic data and the vertical and horizontal extent of contamination at the site, and a DNAPL Report. The Settlement Agreement also deferred delineation and clean up of contaminants in the sediment and around Chattanooga Creek to the CERCLA program. In 1999, SWP conducted a baseline ground-water sampling event to satisfy conditions of the Settlement Agreement with the USEPA. The Baseline Sampling Report, including the required maps, was issued on November 5, 1999 to satisfy requirements of the 1999 Settlement Agreement. The DNAPL report entitled Fate and Transport of Creosote DNAPL and Dissolved Constituents in Rock Aquifer, required by the Settlement Agreement, was previously submitted in May 1998.

1.5 SECURITY PROCEDURES AND EQUIPMENT

Access to the SWP Chattanooga site by unauthorized personnel is minimized, per requirement of TN1200-1-11.06(2)(e). The Chattanooga plant site is surrounded by a 6-foot high, chain link fence with 3-strand bob wire on top and a gate at the main entrance to the plant. Signs with "Danger – Admittance to Authorized Personnel Only" and "Unauthorized Personnel – No Entry Allowed" are displayed along the fence. An employee of SWP is on site during regular business hours. The gate to the site is locked unless the operator is in the main office.

The site operator also locks the gate when he is working at areas on the site that prevent visual monitoring of the gate. The eastern side of the site is bounded by Chattanooga Creek. The creek lies in a large swampy area. This creek provides a physical barrier to the site as it prohibits pedestrian access.

The shop/office and wastewater treatment building are equipped with an electronic security system by Sonitrol. When armed after hours, the system monitors for unauthorized entry to the buildings by using detectors for when a door is opened, sound level detectors for breaking glass, and motion detectors. In the event of an alarm from one of the above sources, the system allows audio monitoring of the building from the Sonitrol offices. Sonitrol personnel will call the site operator, and if necessary, emergency response professionals.

The wastewater treatment building is monitored at all times for fire conditions by Sonitrol. Monitors indicate the presence of smoke, extreme heat, and also provide an alarm based on an excessive rate of the rise of temperature in the building.

1.6 GENERAL INSPECTION SCHEDULE

Inspection Requirements for Security Devices

- Electronic security provided by Sonitrol is automatically checked for proper operation whenever the system is armed (turned on).
- The fence surrounding the site and the gates are inspected at least every quarter and after major storm
 events by the site superintendent. The inspection includes checking for any breaks in the fence, erosion
 under or around the fence, and evidence of tampering or attempted entry. Condition deficiencies are
 noted and repaired as soon as practical.
- All monitoring wells and recovery wells and sumps must be padlocked closed when not being
 monitored or serviced. Padlocks must be inspected on a quarterly basis. This inspection is documented
 on the quarterly Well Inspection Checklist (provided in Appendix E).

Inspection Requirements for Monitoring Equipment

- The groundwater treatment system includes tank level indicators that provide real time measurements of tank liquid levels. These monitors are calibrated annually.
- Tank high levels are monitored by a float switch that shuts down the recovery/treatment system if a high tank level occurs. This prevents overflow of recovered ground water at the 250,000 gallon tank and at the wastewater treatment system compound due to continued system operation. High water levels in recovery wells and sumps are also detected by float switches. These switches will also shut down the recovery/treatment system. Float switches located in each infiltration sump will shut down only the individual infiltration sump in which high water is detected. Shutdown by float switches prevents the potential for system overflow. System or sump shutdown float switches are tested annually for proper operation either by actual system operation or a test operation. Float switch tests are documented on the

Recovery System High Water/Off Float Switch Test Record (provided in Appendix E).

Emergency and Safety Equipment

Site emergency equipment is listed on the Emergency Response Equipment List Inventory form.

provided in Appendix E. This equipment is inspected quarterly and documented on that form. Site fire

extinguishers not included on the Emergency Response Equipment List are inspected monthly and

documented on the Fire Extinguisher Check List. A copy of this check list is also provided in Appendix

E. Respirators are inspected monthly. The inspections are documented on the Respirator Inspection

Record shown in Appendix E.

• Decontamination water is supplied by the city water system. Daily use of this system will verify its

availability. There will be no documentation of operation of the site's city water supply.

• Emergency lighting is located at a strategic point inside the wastewater treatment system building. The

lighting is tested monthly. Tests are documented on the Emergency Light Test Log, provided in

Appendix E.

Smoke and heat detectors are included in the Sonitrol system. All detection units are checked each time

the system is turned on.

The above discussion provides information on operating and structural equipment that are vital to prevent,

detect, or respond to environmental or human health hazards. It also describes testing as necessary for

communications or alarm systems, fire protection equipment and decontamination equipment.

Inspection Requirements for Container Storage Area at Ground-Water Treatment Building

As described in the On-Site Stabilization Report, dated June 7, 1993, SWP Chattanooga operates a ground-

water treatment unit. Wastes typically generated at the facility consist of two streams: 1) Personal

protective equipment and debris, and 2) recovered waste oily water. These materials are temporarily stored

in the wastewater treatment building in closed, labeled drums. The waste is identified as listed waste F034

and is shipped off site to a licensed recycling or permitted TSD facility.

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Only small quantities of waste are typically generated at the Chattanooga Site. As a result of this, waste is shipped off site to a TSD facility within 180 days of generation (or 270 days if the TSD facility is greater than 200 miles from the Chattanooga Site).

When large quantities of waste are generated, the 90-day storage period is observed. Large quantity wastes are temporarily stored in roll off boxes or drums. Roll-off boxes are stored on site near the point of generation. Drums would be stored in the wastewater treatment building or on the loading pad adjacent to the wastewater treatment building.

The container storage area will be inspected on a weekly basis when in operation. This inspection, also shown on the inspection record in Appendix E, includes:

- 1) Integrity of containers includes checking for leaks and cracks in the containers.
- 2) Proper labeling of containers in use hazardous waste labels will be applied immediately after waste is first placed in a container.
- 3) Completion of log designed to document the inspection described above.

Remedial Action

If a problem is identified during inspection, it will be noted in the inspection log, and the appropriate corrections or repairs will be made. Once the problem is corrected, it will be noted in the inspection log.

Inspection Log

The inspection log will include the date and time of the inspection, the name of the inspector, notation of observations made, and the date and nature of any repairs or remedial actions. The inspection logs will be kept for at least three years after the date of inspection. Copies of inspection and maintenance logs for the recovery system will be provided for the relevant six-month period in the semi-annual CAERs.

1.7 JUSTIFICATION FOR WAIVER OF PREPAREDNESS AND PREVENTION REQUIREMENTS

In accordance with Tennessee Rule 1200-1-11-.06(4)(a), the owner and operators of all hazardous waste facilities must prepare a Contingency Plan and Emergency Procedures. These standards apply to owners and operators of all facilities that treat, store, or dispose of hazardous wastes, except as specifically provided otherwise in Rule 1200-1-11-.02.

SWP requests a waiver of the preparedness and prevention requirement as the facility is a closed TSD facility that no longer treats or stores hazardous wastes under post-closure care. As described in Section 4.2 and 4.3, the facility will recover contaminated ground water and DNAPL from the ground-water/DNAPL recovery trench, DNAPL from the oil recovery well, and contaminated ground water from the ground-water intercept trench as necessary to achieve compliance with Ground-Water Protection Standards at the POC. Recovered ground water will pass through an oil-water separation system and be discharged to the POTW under permit. An insufficient amount of DNAPL has accumulated in the trench sumps to allow removal during recent years. The DNAPL monitoring measurements over the last two years indicate that the accumulations have remained at relatively constant levels; therefore, accumulation and removal of DNAPL is not expected to occur at the site in the future.

Preparedness and prevention plans can be waived for the facility since limited, typically small quantities of waste are generated at the facility. These materials are temporarily stored in accordance with 1200-1-11.03. While material is in temporary storage, it is located in the wastewater treatment system containment area. Wastes are temporarily stored in 55-gallon drums before being shipped off site to a permitted treatment or disposal facility.

The small quantity wastes generated consist of personal protective equipment and debris, such as string and plastic. Oily water has been generated in the past from manually pumping DNAPL from off-site wells located in the creek bottom area and temporarily stored in containers at the wastewater treatment plant containment area. This voluntary removal of DNAPL from the off-site wells is not expected to continue under this renewal post-closure permit.

The quantities generated and methods of management required by 1200-1-11.03, combined with security procedures and site management methods described in Sections 1.5 and 1.6 eliminate the need for further preparedness and prevention requirements.

2.0 DESCRIPTION OF WASTE MANAGEMENT UNITS

This section provides information regarding the Hazardous Waste Management Unit (HWMU) (surface impoundment) and the Solid Waste Management Unit (SWMUs) within the Waste Management Area at the site in accordance with the requirements of Tennessee Rule 1200-1-11-.07.

2.1 HAZARDOUS WASTE MANAGEMENT UNIT

SWP-Chattanooga had one regulated HWMU, a surface impoundment. The surface impoundment was designed for wastewater treatment and included a bentonite liner. The generation and storage of an USEPA listed hazardous waste "K001" was a result of wastewater treatment within the impoundment. SWP closed this impoundment in 1987 under a closure plan approved by the TDEC. No K001 waste is on site at this time.

The K001 sludge and visibly contaminated soils were removed from the surface impoundment, prior to closure in 1987. The approved Closure Plan indicated that some K001 constituents may remain in the soil underlying the cap following closure activities. To determine the range in concentrations of constituents remaining, the closure plan specified obtaining and analyzing seven soil cores from the base of the surface impoundment following the removal of the K001 waste and visibly contaminated soils.

Seven soil samples were obtained from the surface of the impoundment base following removal of the K001 waste and visibly contaminated soils. The seven samples were analyzed by Gas Chromatography (US EPA methods found in SW846 for soil matrix). The parameters for analyses were as listed as in 40 CFR 261, Appendix VII (K001). Results of the sampling (as presented in Section C of the 1990 Post-Closure Permit Application) indicated the presence of residual K001 constituents in the range of 1 to 18,755 parts per million at the surface of the cleaned bottom of the closed pond.

Potential migration of the residual K001 constituents in ground water will be controlled by ground-water corrective action as required during post-closure care (see Section 4.0).

2.2 SOLID WASTE MANAGEMENT UNITS

Specific information for each of the SWMUs is provided in Table 2-1 including the TDEC-designated unit number, general description of the unit, dates of operation, information regarding releases, and results of sampling and analysis. Applicable technical reports are incorporated by reference. Figure 2-1 provides SWMU locations.

3.0 CURRENT SITE CONDITIONS

SWP operated a wood-treating plant at the site from 1924 until 1988, using only creosote as a wood-treating material. Normal plant operations have resulted in SWMUs at the site other than the regulated unit, which represent potential sources for ground-water contamination. SWP has performed an extensive assessment of the plant site to determine the nature and extent of ground-water contamination associated with past plant operations. The nature and extent of ground-water contamination at the site have been identified by this assessment, and SWP has begun corrective action.

The only hazardous waste handled at the site was K001 sludge produced as a result of treating wood preserving wastewater in surface impoundment 3A. The sludge was removed from the surface impoundment during July and August of 1986.

Releases of creosote constituents occurred in the main plant process area, CERCLA collection pond, and old overland flow treatment area where process wastewater was discharged prior to 1960. Creosote constituents exist in surface soils in the treated wood storage areas and in the sediments of rainwater collection ponds. Solid wastes consisting of treated and untreated wood waste, metal banding, cinders, empty drums, rubber tires, concrete and similar other debris were present within and adjacent to the CERCLA collection pond. Treated timbers were used to stabilize a steep slope adjacent to the Chattanooga Creek north of ponds 2A and 2B. Some waste (metal banding, tires, timber, etc.) has been observed on this steep slope which could have been placed during plant operations or resulted from creek flooding. Extensive cleanup of the creek banks was conducted during the 1990s. Debris was removed from a large portion of the site creek banks and transported off site for disposal at a local landfill.

To comply with Tennessee Rule [1200-1-11.06(6)(d)], SWP has conducted extensive studies to define areas of contamination at the site. Ground-water monitoring, surface water monitoring, test pits, soil test borings, and hand auger borings have been performed at many locations across the site to identify the locations of contamination. Figures 3-5, 3-6, and 3-7 show the location of these investigative actions. The results of the investigations indicate that separate-phase oil (DNAPL) and contaminated ground water exist at several locations at the site. The existence of these multiple potential contaminant sources has resulted in the development of a "site-wide" approach to remediation of ground-water contamination.

As shown on Figure 1-1 the waste management area at the site has been established to incorporate both hazardous and solid waste management units considered as potential sources for ground-water contamination. The objective of this approach was to allow assessment and corrective action of ground-water contamination to focus on requirements for protecting human health and the environment at the point of exposure rather than at discrete, non-exposure locations across the site. This "site-wide" remediation approach will allow ground-water recovery to be accomplished effectively and efficiently at the downgradient edge of the waste management area rather than at multiple points within the site while providing the necessary protection of human health and the environment required under 40 CFR 264.101 (TN Rule 1200-1-11-.06(6)1).

SWMUs located within the waste management area are located in areas affected by the ground-water corrective action plan described in Section 4.0 of this application. Migration of releases from these units will be controlled by the operation of the pumping system described in the corrective action program.

3.1 NATURE AND EXTENT OF CONTAMINATION

3.1.1 Dense Non-Aqueous Phase Liquids

Dense non-aqueous phase liquids (DNAPL) have been detected at several locations at this site as shown on Figure 3-1. DNAPL is monitored semi-annually by measuring the accumulation in monitoring wells where DNAPL is present. The accumulation measurements obtained during sampling events for the last two years are presented in Table 3-1. The horizontal extent of DNAPL contamination is defined based on the observed occurrences of DNAPL in monitoring wells, knowledge of past plant operations, and the known subsurface migration patterns of DNAPL. The DNAPL has accumulated at the soil/rock interface at various locations both in the former plant operations area and along Chattanooga Creek. The distribution of

occurrences and non-occurrences of accumulations of DNAPL, both horizontally and vertically, indicate that the DNAPL in these two areas are not connected via subsurface transport. DNAPL accumulations in the plant operation area have been observed at locations directly beneath the point of release near the CERCLA Pond, Overland Flow Treatment Area, Drip Track Area, and near a past creosote spill. DNAPL does not tend to move horizontally after migrating downward to a confining layer; therefore, the extent of DNAPL beyond the areas of release is expected to be limited. This limited extent of DNAPL is demonstrated by the lack of DNAPL in well clusters U1 and U2 which are at a lower top-of-rock elevation than wells WL-1, WQ-2, WQ-2B, and WQ-5, where significant levels of DNAPL have been encountered, and by the lack of DNAPL in well C-15A, which is at a top-of-rock low adjacent to the drip-track area.

The vertical extent and volume of DNAPL contamination at the plant area is limited by the presence of the low hydraulic-conductivity rock zone. DNAPL has moved downward into the subsurface soil and rock from points of release to depths where low hydraulic conductivity material exists, as described in Section 1.2. Common behavior of heavy liquids in situations similar to the SWP site is shown in Figure 3-2 (modified from Pankow and Cherry, 1996). DNAPL first forms pools of limited extent at the boundary between the residual soil and the rock beneath the points of release. It then moves downward into the rock through fractures and into "voids" until it reaches low-hydraulic conductivity rock (Figure 3-2). Investigative drilling at the SWP site shows that, when found below the points of release, creosote commonly accumulates at top of rock and in fractures in the rock. Creosote has been shown to penetrate only into the infrequent fractures in the low hydraulic conductivity rock (SWP, 1990).

Therefore, the vertical extent of DNAPL in the plant area is interpreted not to extend a significant depth into the low hydraulic conductivity rock. Where present in the low hydraulic conductivity rock, DNAPL is within the less frequent, near vertical fractures. As there is no continuing DNAPL release and monitoring wells with DNAPL do not show significant changes in accumulation, it is likely that the vertical extent of DNAPL has reached a steady state condition, and is not expected to increase significantly in the future.

3.1.2 Constituents of Concern

Organic constituents associated with past plant operations have been identified in ground water and soil at the site. Thirty-three site-specific constituents characterize the constituent contamination at the site. These 33 site-specific constituents include various phenolics, light polynuclear aromatic hydrocarbons, heavy polynuclear aromatic hydrocarbons, single-ring aromatics, and inorganics as identified on Table 3-2. A detailed description of the selection of site-specific constituents is included in Appendix C.

Inorganic constituents (arsenic, barium, beryllium, chromium, cobalt, copper, lead, nickel, sulfide, vanadium and zinc) have been identified in ground water at this site (including the background well). These identified inorganic constituents, with the exception of arsenic, chromium, and sulfide, are not considered site-specific constituents because they were not present in any wood preservative reportedly used at the site. A comprehensive, site-wide analyses of ground-water samples performed in December 1989 showed detected concentrations of total metals below the Primary Drinking Water Standards (40 CFR 143.11) except for chromium which was detected of a concentration of 0.051 mg/l (MCL = 0.05 mg/l).

3.1.3 Constituents in Soil

Several investigations have been conducted at SWP to evaluate constituents in soil including a Drip Track Area Assessment, the CERCLA Pond Assessment, the Tank Farm Assessment, and the Confirmatory Sampling event.

Twenty test pits were excavated in 1984 in areas of high resistivity around the HWMU and in the drip track area to determine the extent of soil contamination and DNAPL as shown on Figure 3-3. Free oil was detected in several test pits as shown on Figure 3-4. Soil samples were collected from 13 of the test pits and analyzed for K001 constituents. Results of the analyses indicated the presence of wood preserving constituents in the subsurface soil (Table 3-3). The lateral extent of constituent migration was less than 150 feet downgradient from surface impoundment 3A. An additional four test pits and six borings were installed in the Drip Track area in 1986 and analyzed for K001 constituents. Results are provided in Table 3-4. Several locations contained wood preserving constituents in the subsurface soil. These data were used to support source removal actions as described in Section 4.2.

A CERCLA Pond Assessment was performed in 1986 (SWP, 1989). Five soil borings and 13 hand auger borings were installed at the locations shown in Figure 3-3 to visually determine the extent of oil in the subsurface. Oil was noted in each of the test borings. These data were also used to support source removal actions as described in Section 4.2.

A Tank Farm Assessment was performed in 1987 in the vicinity of the two surface tanks. Six test pits were excavated. No visual indication of contaminated soil was discovered in any of the test pits.

A Confirmatory Sampling was conducted in 1994 under the HSWA permit (SWP, 1995). Soil samples were collected from SWMU Nos. 1, 2, 3, 4, 6, 8, 12, 13, 21, 24, and 29 as well as Mixed Wood Handling Areas 1 and 2 during this sampling event (see Figure 3-5). Data from this sampling event, used to evaluate the distribution of contaminants in soil, are provided in Table 3-5.

The distribution of soil contamination within the SWMU areas is defined for both surface and subsurface soil. As shown on Figure 3-5, the distribution of contamination in the soil is generally beneath the identified sources in soil; stormwater ponds 1A, 2A, and 3B (SWMU Nos. 1, 3, and 6); Drip Track Area (SWMU No. 8), the Treated Wood Storage Areas (SWMU Nos. 12, 17, and 21), the Overland Flow Treatment Area (SWMU No. 13), the Natural Pond (SWMU No. 19), Dump Area (SWMU No. 24), and the former Treatment Plant (SWMU No. 29).

3.1.4 Constituents in Ground Water

SWP's assessment has been targeted at identifying locations of ground-water contamination using monitoring wells placed at specific locations selected based on locations of expected releases associated with plant operations (SWMUs) and ground-water flow directions. The 14 SWMUs identified as actual or potential sources of ground-water contamination cover most of the Waste Management Area (Figure 1-1) such that the ground-water contamination from one individual unit cannot be isolated from surrounding or upgradient units. Therefore, SWP has identified a "zone of ground-water contamination" which encompasses contamination associated with releases from individual SWMUs.

The horizontal extent of ground-water contamination associated with past operations at the plant is defined for the residual soil water bearing zone using the data collected during the 1999 Baseline Sampling (Table 3-6). As shown on Figure 3-6, the horizontal extent of the most prevalent constituent dissolved in ground water (naphthalene) within the residual soil water-bearing zone is generally beneath the identified sources in soil; the K001 Pond, Drip Track Area, Overland Flow Treatment Area, AOC Creosote Spill, and CERCLA pond. As shown on Figure 3-7, the horizontal extent of ground-water contamination in the highly fractured rock water-bearing zone extends in the direction of ground-water flow from the plant-area sources (K001 Pond, Drip Track Area, Creosote Spill Site, CERCLA Pond) toward Chattanooga Creek. In both Figures 3-

6 and 3-7, the horizontal extent of ground-water contamination boundary contains those locations where naphthalene, the most frequently detected constituent, has been identified in ground water. As ground water flow is faster in the highly fractured rock zone than in the residual soil zone, the extent of contamination in the highly fractured rock is greater than that in the residual soil. Contamination of ground water within the residual soil and highly fractured rock water bearing zones (i.e., uppermost aquifer) has not been indicated to be associated with plant operations at the tank farm, treated wood storage areas or surface water retention ponds.

Well C-19A lies outside of the waste management area (C-19 is across Chattanooga Creek from the site). Analyses of samples from this location has occasionally indicated concentrations of phenolic, single-ring aromatic and light PAH constituents. Since ground water flowing beneath the site is discharging into the creek, the contamination at C-19A is expected to result from the nearby DNAPL source in the creek channel and not from migration from a plant site source. The same is expected at other wells along the creek (C-33A, C-24A, C-25A, C-26A, C-27A, and C-28A).

The vertical extent of dissolved constituents in ground water has been defined at the western (i.e., down dip) perimeter of the Waste Management Area with shallow-rock well WQ-1 and "deep" rock well C-31B. Ground water in the area of the creosote spill was assessed through the installation of five monitoring wells of different depths. Concentrations of constituents were highest in the well L-4B, located in the limestone water bearing unit. The deepest monitoring well L-4E, installed to a depth of 291 feet also contained PAHs but at significantly lower levels. In addition, at location C-16, located north of the drip track, and U-4, located south of the drip track, the groundwater contamination appears to be limited to the residual soil zone.

The rate of horizontal migration of dissolved constituents is expected to be less than ground-water velocities in the highly fractured rock zone (less than 45 feet per year) and significantly less (by a factor of 2 or more) than the 15 feet per year ground-water velocity in the residual soil zone. This expected retardation is due to advection, dispersion, decay, chemical degradation, and bacterial activity.

3.1.5 Constituents in Surface Water

Surface water samples have been collected at the site by SWP and the USEPA. To assess surface water quality at Chattanooga Creek in the vicinity of the facility, samples were collected by Southern Wood

Piedmont on June 20, 1985 at locations along the creek (S-1 through S-8 and S-10) and at flowing drainage features within the low swampy area down-gradient from the plant (SS-1 through SS-4). These sample locations are shown on Figure 3-10. The results of chemical analysis for K001 wood preserving constituents are presented in Table 3-7. No evidence of wood preserving constituents in surface water, in either the on-site drainage features or in Chattanooga Creek, was found.

SWP collected one surface water sample from the Natural Pond (SWMU No. 19) in 1994 as part of the Confirmatory sampling and analyzed the sample for extractable and volatile organic compounds. Results of the analyses were non-detect, indicating that the constituents detected in the sediments of the Natural Pond are not affecting surface water quality. SWP collected three surface water samples from the creek again in 1995. The samples were collected upstream and adjacent to SWP and analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides/PCBs, cyanide, and metals. Analytical results from the surface water samples did not indicate contamination associated with the SWP site (Table 3-7).

The USEPA collected surface water samples from Chattanooga Creek as part of the Chattanooga Creek Sediment Profile Study dated April/August 1992. Surface water samples were collected upstream, adjacent to, and downstream of the SWP site. Results of the surface water sampling indicated no apparent change in the water quality at any of the locations until the sample collected on the northeast portion of SWP property near monitoring well C-26A where toluene was detected at very low levels (less than 1 ug/L). No other site-specific constituents were detected in the surface water samples collected near the SWP site from Chattanooga Creek.

3.2 CURRENT SITE ACTIVITIES

Corrective measures for affected media have been implemented and are described in Section 4.0 of this application. The corrective action system currently in place consists of the following:

- Ground water/DNAPL recovery trench through former drip track area
- Ground water intercept trench adjacent to Chattanooga Creek

Figure 1-1 provides a site plan with features of the corrective action systems in place. Additional site controls are described in Section 1.5. Anticipated future activities at the site include those associated with environmental restoration. No industrial operations are planned at this site.

The ground-water corrective action system has been operated voluntarily until resolution of GWPS applicable along the POC. The effectiveness of the operating system has been monitored by measuring ground-water elevations at the site monitoring wells semi-annually (hydraulic control evaluation) and sampling ground-water quality along and downgradient of the point of compliance.

4.0 STABILIZATION MEASURES AND ONGOING CORRECTIVE ACTION

4.1 OBJECTIVES

The overall goal of corrective measures implemented and available for operation under this permit at the site has been and will be to protect human health and the environment from exposure to hazardous waste constituents released to soil and/or ground water at the site HWMU and SWMUs, as required under 40 CFR 264.101. Supplemental objectives for the corrective measures were (and remain) to: 1) achieve media cleanup objectives appropriate to the assumptions regarding current and reasonably expected land use(s) and current and potential beneficial uses of water resources, and 2) remediate the sources of releases so as to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Specific to activities conducted and available at the SWP Chattanooga site, the objectives of the corrective actions are to:

- Remove obvious sources for potential direct contact exposure to hazardous creosote constituents (exposed surface deposits) and replace the removed materials with native soil from an uncontaminated portion of the site.
- Collect and remove, as much as practical, subsurface accumulations of DNAPL which represent sources for continued contamination of ground water.
- Recover ground water downgradient of the most upgradient areas of significant releases to ground water at the site (the HWMU and nearby drip track) as required to achieve compliance with GWPS at the POC.
- Intercept the migration of contaminated ground water flowing toward Chattanooga Creek as needed
 to prevent human or ecological exposure above acceptable risk levels at this first point of
 environmental exposure to contaminated ground water.

Because wood preserving operations were the only historical industrial use of the facility, SWMUs identified throughout the site had similar constituents of concern. It was determined early on that remediation of soil and ground water contamination to meet the above corrective action objectives would require source removal in many of the SWMUs. It was also determined that remediation of ground water within the uppermost aquifer to meet the objectives, given the commitment to maintaining site controls, could be achieved for the entire site with ground-water withdrawal beneath the former drip track (downgradient of the HWMU) and downgradient of the SWMUs prior to discharge into Chattanooga Creek. As described in the 1990 Part B Permit Application, consistent with 40 CFR 264.90, a Waste Management Area (WMA) was delineated by circumscribing the hazardous waste management unit (the closed surface impoundment) and all solid waste management units at the SWP-Chattanooga plant site. The Chattanooga site WMA is depicted on Figure 1-1.

Source controls (i.e., stabilization measures) were implemented within select SWMUs, while the overall ground-water corrective action program has been developed using the WMA approach. The objective of this approach was to allow corrective action for ground-water contamination to focus on protecting human health and the environment at the point of exposure rather than at discrete non-exposure locations across the site.

4.2 SOURCE CONTROL (CONTAMINATED SOIL AND DNAPL REMOVAL – SWMUS AND HWMU)

Surface Removal Actions

The objective to remove obvious sources for potential direct human contact, ingestion or inhalation exposure to hazardous creosote constituents (exposed surface deposits) was accomplished by the removal of visibly contaminated surface materials (including soil, sediment, debris, crushed stone and DNAPL) from various SWMUs and the HWMU. SWP documented these surface removal activities in the 1990 Part B Permit Renewal Application (SWP, 1990), the Compilation of Assessment and Corrective Action Activities report (SWP, 1992), and the On-Site Stabilization Measures Report (SWP, 1993). These surface removal actions are summarized as follows.

 Removal of more than 1,000 tons of hazardous waste (K001 sludge) and contaminated soil from the K001 pond (Pond 3A, SWMU 5) during the summer of 1986 and closure of the pond in accordance with an approved closure plan in the spring and summer of 1987 (LAW, 1987). • The draining and removal of visibly contaminated sediments from Pond 3B (SWMU 6) in 1986.

performed in conjunction with the closure of Pond 3A (LAW, 1987)

 Removal of an estimated 5,350 tons of creosote contaminated material (gravel ballast, soil and DNAPL which had collected at the ballast/soil interface) from the drip track area (SWMU No. 8) in 1989 (SWP, 1993). The approximate area from which these materials were removed is shown on Figure 4-1.

 Removal of an estimated 1770 tons visibly contaminated soil, debris and DNAPL within the CERCLA pond (SWMU No. 11) and adjacent landfill (SWMU No. 7) and overland flow treatment area (SWMU No. 13) in 1988. The approximate area from which these materials were removed is shown on Figure 4-1.

Areas where surface removal actions were performed were filled with native soil from an uncontaminated portion of the site after completion of the removal actions. Figures 4-2 and 4-3 provide the limits of the surface removal actions at the Drip Track Area and the Landfill/CERCLA Pond/Overland Flow Area, respectively.

Controls exist to limit direct contact exposure with contaminated surface soil remaining in place in other areas. In general, these controls consist of limiting access to the site and limiting potential site use. Section 5 of this report addresses potential risk in soil remaining at the site based on existing exposure pathways. Ongoing DNAPL removal (subsurface source control) activities are discussed below.

Subsurface Removal Actions

In addition to the removal of contaminated surface material, removal of subsurface DNAPL in select SWMUs has been implemented. The objective to collect and remove, as much as practical, subsurface accumulations of DNAPL which represent sources for continued contamination of ground water has been accomplished by the collection of DNAPL present at the soil/rock interface in the former drip track area (SWMU No. 8) and in the pond/landfill/overland flow treatment area (SWMU Nos. 11, 7 and 13, respectively). The corrective action systems in place to collect DNAPL from the select SWMU areas are described below.

As reported in the 1993 On-Site Stabilization Measures Report, a recovery trench collecting DNAPL and ground water beneath the former drip track area was installed in the early 1990s and has been in operation since April 1993. The trench consists of four sumps, each 3 feet in diameter, identified as

recovery sumps U1 through U4. These sumps are installed to the top of rock (depths of approximately 25-40 feet below existing ground surface) within the approximate 1200-foot long trench (Figure 4-1). A layer of bentonite was placed along the bottom of the trench, on top of the exposed rock surface. The original design of this trench was for DNAPL recovery only. A measurable quantity of DNAPL was reported at sumps U2 and U3 in this trench at the time of installation, so oil pumps were installed in sumps U2 and U3. Revisions to the design were made during 1992 so that, in an effort to draw more DNAPL into the trench, ground water would also be recovered from the trench. Ground water pumps were installed in sumps U1 through U4. The as-built drawings for the ground-water/oil recovery trench are provided in Appendix B.

Total annual volumes of DNAPL recovered from each sump are summarized in the Annual Ground-Water Quality Monitoring Reports. Since startup of the DNAPL collection system in April 1993, approximately 700 gallons of DNAPL has been recovered from the oil recovery sumps within the former drip track area. Oil in sufficient quantity to pump has not been present since late 1994. The sumps are routinely checked for the presence of oil and oil pumps are still mounted in sumps U2 and U3 in the event that oil is observed.

A 6-inch diameter recovery well, identified as RW-1, was installed in the area of the former CERCLA pond to facilitate recovery of DNAPL previously indicated to exist in that area. The location of oil recovery well RW-1 is shown on Figure 4-1. The well was installed at the location of a low point in the soil/rock interface, to a depth of approximately 48 feet bgs. The pump and collection piping for this well were installed during the first quarter of 1993 and became operational during the second quarter of 1993. The as-built drawings for the oil recovery system including this well are provided in Appendix B. The well log is provided in Appendix B. To date, the DNAPL accumulation in this well has been insufficient to activate the oil-recovery pump.

4.3 PROTECTION OF GROUND WATER

The point of compliance (POC) is identified as the downgradient boundary of the WMA and is located as shown on Figure 1-1. Ground water quality will be monitored along the POC to document effectiveness of upgradient corrective action and the need for the ground-water intercept near Chattanooga Creek by comparison with Ground-Water Protection Standards (GWPS). Section 4.3.1 provides the basis for the GWPS. Interception of contaminated ground water flowing toward the point of environmental exposure

(Chattanooga Creek) can be accomplished, as needed, by pumping from the ground-water intercept trench located between the POC and Chattanooga Creek. Additionally, ground water remediation can be performed within the site by withdrawal of contaminated ground water and DNAPL (when present) from a recovery trench installed in the former drip track area of the site. Sections 4.3.2 and 4.3.3 describe these corrective action systems in place for protection of ground water.

4.3.1 Ground-Water Protection Standards

At the SWP site, the point of exposure (POE) for contaminated ground water is the surface water of Chattanooga Creek. Transport of constituents from the point of compliance (POC) to the POE occurs via subsurface transport to the creek bank and subsequent dilution of ground water with surface waters in the creek after discharge of ground water into the creek. There is no human or environmental exposure at the POC or between the POC and the POE. Therefore, the GWPS applicable for compliance monitoring at the POC have been determined as alternate concentration limits (ACL) in accordance with TN Rule 1200-1-11.06(6)(e)2. An ACL is the concentration at the POC below which the Maximum Allowable Concentration Limit (MACL) will not be exceeded at the POE.

The ACL was calculated based on dilution factors for ground water discharging into Chattanooga Creek at 3 day, 20-year low creek flow. When calculating the ACL, the constituent concentrations in Chattanooga Creek were assumed to be equal to the governing MACL. The allowable constituent concentrations in the ground water at the point of discharge to the creek, and thus that at the POC, were back-calculated by dividing the MACL by the appropriate dilution factors. It was conservatively assumed that the constituent concentration in the ground water at the POC (point of application of ACL) was the same as the constituent concentration in the ground water at the creek bank (i.e. subsurface attenuation was assumed to be zero). Table 4-1 provides a summary of the Ground-Water Protection Standards (GWPS) for the SWP Chattanooga site. Appendix C provides additional detail regarding the development of the GWPS.

4.3.2 Ground-Water/DNAPL Recovery Trench Through Former Drip Track Area

As reported in the 1993 On-Site Stabilization Measures Report and discussed in Section 4.2, a 1,200-feet long trench to allow collection and removal of DNAPL and ground water beneath the former drip track area was installed in the early 1990s and has been in operation since April 1993. The main purpose of

ground water recovery from this trench is to enhance oil recovery from this area and to intercept ground water flowing in residual soil from beneath the closed HWMU (Pond 3A) as needed to maintain compliance with GWPS at the POC.

Recovered ground water is pumped to a 150,000-gallon holding tank, through an oil-water separator, and then to a 80,000-gallon holding tank prior to being discharged to the POTW in accordance with a POTW discharge permit. Operational details of the ground-water recovery system are provided in the Annual Ground-Water Quality Monitoring Reports. Ground-water recovery volumes are recorded by SWP. Total annual pumping volumes from each sump have been summarized in the Annual Ground-Water Quality Monitoring Reports. The system recovered 3,052,160 gallons of ground water and discharged this water to the POTW during 2000 (SWP, 2000). Insufficient quantities of DNAPL have migrated to the trench sumps for removal since initial removal of approximately 700 gallons through 1994.

Ground-water elevation measurements obtained from accessible sumps and residual soil monitoring wells located in the vicinity of the recovery trench have been summarized in the Annual Reports. Potentiometric surface maps developed from these measurements have demonstrated that ground-water flowing in the residual soil beneath the closed hazardous waste management unit (pond 3A) can be effectively captured at the recovery trench (see Figure 1-11). The need for continued operation of the ground-water/DNAPL recovery trench will be determined under this permit as described in Section 7.3 (Ground-Water Monitoring Plan).

4.3.3 Ground-Water Intercept Trench Adjacent to Chattanooga Creek

As reported in the 1993 On-Site Stabilization Measures Report, a ground-water intercept trench, installed along Chattanooga Creek during the Fall of 1990, has been in operation since July 10, 1991. The intercept trench is located in the area along Chattanooga Creek (downgradient of the WMA) where contaminated ground water from the former plant site has been indicated to discharge into the creek. The purpose of the trench was to intercept and remove contaminated ground water within the uppermost aquifer (residual soil and fractured rock) between the POC and the point of exposure (Chattanooga Creek) until agreement on GWPS (to apply at upgradient POC) could be reached to see if pumping from this intercept was necessary. Ground water is pumped from three sumps (identified as recovery sumps L-1 through L-3), installed within the approximate 550-foot long trench (Figure 4-1). The trench was constructed with an impermeable membrane wall along the creek side of the trench to reduce the volume

of ground-water inflow from the creek to the trench. The as-built drawings for the ground-water/oil recovery trench are provided in Appendix B.

Recovered ground water is pumped to a 150,000-gallon holding tank, through an oil-water separator, and then to a 80,000-gallon holding tank prior to being discharged to the POTW in accordance with a POTW discharge permit. Operational details of the ground-water recovery system are provided in the Annual Ground-Water Quality Monitoring Reports. Ground water volumes are recorded by SWP. Total annual pumping volumes from each sump have been summarized in the Annual Ground-Water Quality Monitoring Reports. Approximately 4,550,200 gallons of ground water were pumped from this intercept trench and discharged to the POTW during 2000 (SWP, 2000).

Ground-water elevation measurements obtained from accessible sumps and monitoring wells located in the vicinity of the intercept trench have been summarized in the Annual Reports. Potentiometric surface maps developed from these measurements demonstrate that ground water flowing toward Chattanooga Creek in both the residual soil and limestone water bearing zones can be effectively intercepted by the trench (Figure 1-11 and 1-12).

4.4 EFFECTIVENESS

As indicated in Section 4.2, surface removal actions were performed at the SWP Chattanooga, TN site in the late 1980s, and subsurface removal systems were put in place in the early 1990s and are still in place. SWP performed source removal to the extent practical in areas with heavily contaminated soil to address leaching to ground water and exposure to contaminated surface soil. Facilities are in place to continue to remove available DNAPL (if any) from identified areas of the site to mitigate continued release of contaminants to ground water. Section 3.1.2 summarized the nature and extent of contamination in soil remaining at the site. Although site-specific constituents remain in shallow soil in several areas of the site, including SWMUs where removal actions were implemented, evidence of the effectiveness of this source removal is demonstrated by the limited detections of site-specific constituents in ground water within the residual soil downgradient of the removal areas, over 10 years after the removal, as reported in the Report of Baseline Sampling (SWP, 1999). Section 5 of this report addresses potential risk in soil remaining at the site based on existing controls and exposure pathways.

The recovery trench collecting DNAPL and ground water beneath the former drip track area has been in operation since April 1993. As indicated on Figure 1-11, ground water flowing in the residual soil beneath the closed hazardous waste management unit (pond 3A) can be effectively captured at the recovery trench, if necessary to allow compliance with GWPS at the POC. An insufficient quantity of DNAPL has accumulated in the trench sumps to allow removal since late 1994.

As previously stated, the elevation contours shown on Figures 1-11 and 1-12 demonstrate that pumping from the ground-water intercept trench near Chattanooga Creek can effectively intercept contaminated ground water flowing toward Chattanooga Creek within the uppermost aquifer.

5.0 QUALITATIVE SITE RISK

The SWP site is the site of former wood treatment, storage, and wastewater treatment operations. The nature and extent of contamination at the former SWP site was presented in Section 3.1. Lists of site-specific constituents were provided in Table 3-1. The following sections describe the populations potentially exposed, currently and in the future, to the site contamination and provide a qualitative evaluation of risk associated with these potential exposures considering controls in place at the site.

5.1 POTENTIAL RECEPTOR IDENTIFICATION

The potentially exposed populations at the SWP site were identified for both the current and the anticipated future land use of the site. As described in Section 1.3, the site is currently inactive with the exception of a ground-water recovery and treatment system operated by the site superintendent. The site is surrounded by a chain-link fence on three sides. Chattanooga Creek borders the site on the fourth (east) side.

Human

Current and future on-site receptors may include construction workers, environmental samplers, and the site superintendent. The site superintendent conducts maintenance activities such as weeding around ground-water monitoring and recovery wells and routine lawn maintenance such as grass mowing. Human receptors residing and/or working in the vicinity might trespass onto the site, but these receptors would be expected to trespass infrequently and exposure to these receptors would be much less than the on-site receptors mentioned above. The site is fenced on three sides with an access gate that remains locked when

the site superintendent is not in the office or when he leaves the site. Warning signs are conspicuously posted at the gate and around the perimeter fence. Chattanooga Creek and its swampy floodplain borders the site and serves as a natural deterrent to public access. Therefore, trespassers are not considered to be significant potential receptors.

Humans working at the SWP site will not consume contaminated ground water because potable water is provided by the Tennessee-American Water Company. Known water supply wells in the site area are used for industrial purposes and most are completed in a separate geologic formation from that containing contaminated ground water beneath the site (see Figure 1-13). The closest known industrial water supply well is over one-half mile from the site. Contaminated ground water beneath the site discharges into Chattanooga Creek and a ground-water intercept trench is available on site to intercept this discharge if the ground water is above safe environmental levels.

Ecological

An ecological evaluation of Chattanooga Creek was conducted in 1996 in order to document its physical, chemical and ecological characteristics (LAW, 1997). Several of the objectives of the ecological evaluation were to identify plants and wildlife associated with the SWP Site, perform an evaluation of the biological status of Chattanooga Creek, and characterize terrestrial and aquatic habitat of the creek adjacent to the SWP Site. The results of these evaluations were used to identify terrestrial and aquatic ecological receptors located on or found within the SWP Site. A listing of mammals, reptiles, and amphibians observed near Chattanooga Creek by TDHE and LAW is presented in Table C-4 of Appendix C. Additionally, a list of fish species inhabiting Chattanooga Creek is presented in Table C-5 of Appendix C.

5.2 EXPOSURE PATHWAYS

A complete exposure pathway has four essential components. Without the presence of all four components, exposure typically does not occur. The USEPA risk assessment guidance (USEPA, 1989) defines an exposure pathway as consisting of the following elements:

- 1. A source and mechanism of chemical release to the environment (i.e., a source of contamination)
- 2. An environmental transport medium for the released chemical (e.g., soil or ground water)

- 3. A point of potential receptor contact with the contaminated medium (i.e., an exposure point)
- 4. A route of exposure at the exposure point (e.g., ingestion, inhalation, or dermal contact)

The source of release, transport mechanisms, exposed populations, and routes and pathways of exposure to chemicals released at SWP Chattanooga are described in the following sections.

<u>Sources and Release Mechanisms</u> – Discharges to soil via overflows, leaks, and spills of creosote (DNAPL) and creosote constituents present in waste water comprise the former release mechanisms at the SWP site. These releases are associated with operation of the former wood treating plant. Therefore, impacted soils at the surface and near surface comprise the source of environmental contamination at the site.

Contaminant Fate and Transport – Creosote constituents and DNAPL released to soil may be transported from the source areas by percolating through soil layers to ground water or by release to ambient air via fugitive dust generation. Surface-water runoff from the site has been sampled and found to be free of site contaminants as shown in the most recent stormwater runoff sample (SWP, 1999a and SWP, 2000a) and is, therefore, not considered to be a transport media for hazardous constituents at this site.

Soil is a transport media at this site. Chemicals in the soil may be contacted directly by a potential receptor employed at the site or be carried through the air, as fugitive dust, to a potential receptor (i.e., a site worker). However, transport through air has been minimized by waste removal, filling ponds with clean soils, submerging soil under water or covering with gravel, and maintaining a vegetative cover. In addition, direct contact with soil is minimized through the use of personal protective equipment (PPE) during routine maintenance, environmental sampling, and construction activities.

Ground water containing site-specific constituents may discharge to and dilute with surface water in Chattanooga Creek. Contaminated ground water was evaluated as an exposure pathway but this pathway will be controlled as required by operation of an intercept trench located adjacent to Chattanooga Creek. Ground water will be monitored at the POC, and, if GWPS are exceeded, the intercept trench will be operated to prevent migration of ground water to Chattanooga Creek.

The following sections evaluate potential exposures to site contamination. The exposure assessment

identifies pathways by which human and ecological receptors are potentially exposed to chemicals in environmental media at the site.

5.3 ENVIRONMENTAL EXPOSURES

Human

Based on current and future land use scenarios, soil exposures may potentially occur for the present and future site superintendent (during bush hogging, weedeating around monitoring wells, and lawn care), plus present and future on-site construction workers and environmental samplers. Receptors may potentially be exposed to surface, submerged, and/or subsurface soil.

The potentially complete exposure pathways at this facility are as follows:

- 1. Dermal contact with potentially contaminated surface, submerged, and subsurface soil on site;
- 2. Incidental ingestion (via hand to mouth contact) of potentially contaminated surface, submerged, and subsurface soil; and
- 3. Inhalation of fugitive dusts in air originating from potentially contaminated surface soil or submerged and subsurface soil disturbed during intrusive activities.

Exposure to chemicals in the soil may occur through skin absorption during intrusive activities (i.e., maintenance and construction work). Incidental ingestion of soil may result from hand to mouth activities such as smoking, drinking, or eating if proper personal hygiene, such as washing, is not practiced. The generation of fugitive dust is common with the use of lawn-care maintenance equipment and construction equipment and constitutes a pathway for inhalation of potentially contaminated soil.

Summary of Potential Exposure Pathways – Current and future construction workers, the site superintendent, and environmental samplers may be potentially exposed to contaminants in the surface, submerged, and/or subsurface soil via incidental ingestion, inhalation of fugitive dusts, and dermal contact. The potential exposure pathways and potential receptors are summarized on Table 5-1.

Further evaluation of these pathways is not warranted due to the presence of measures and engineering controls currently in effect to mitigate exposure for these potential receptors. These measures include dust control during site disturbance, use of dust masks during mowing activities at selected SWMU sites, as outlined in Table 5-1, and the maintenance of a site vegetative cover to mitigate inhalation of contaminated soil. The visually contaminated surficial soils (0-1.5 feet below ground surface) in the drip track area and the CERCLA pond, adjacent landfill, and overland flow treatment area have been removed. Construction workers are not expected to be in contact with subsurface soils due to requirements for the use of personal protective equipment (PPE) during construction activities. In addition, the site is fenced, restricting access to the site. Therefore, exposure to contaminated soils has been effectively minimized.

As discussed before, ground water is not a current transport medium at this site because the ground-water pathway is incomplete (i.e., no receptor exposure point due to available site migration control). The potential exposure from discharge of contaminated ground water to Chattanooga Creek will be controlled as needed with operation of the intercept trench based on ground-water monitoring at the POC. Operation of the trench will continue until concentrations of site-specific constituents at the POC are below GWPS to be protective of human health and the environment. GWPS were determined as described in Appendix C.

Ecological

Field observations performed in 1995 and 1996 indicated a variety of plants and animals present at the SWP site (see Table C-4). Fifty-eight species of wildlife were identified, including one reptile, one amphibian, nine mammals, and 47 bird species. In addition to the three mammals captured by trapping, six additional mammals, including gray squirrel, beaver, and swamp rabbit, were observed. Due to the removal of visibly contaminated surface soil and the continuous mowing of the vegetative cover on the SWP site (which is assumed to reduce habitat utilization), significant direct ecological exposures to constituents at the SWP site are unlikely. While exposure to constituents in the soil at the site are unlikely, mammals, birds, amphibians, and reptiles foraging and/or inhabiting areas of the site adjacent to Chattanooga Creek (old overland flow treatment area) may be exposed to contaminated soil located within the creek's floodplain via ingestion, direct contact, and the food web.

Aquatic ecological receptors may be exposed to contaminated submerged soils (i.e., sediments) within portions of Chattanooga Creek in the vicinity of the SWP site. Aquatic organisms, such as fish and aquatic invertebrates, are exposed more to contaminants in the water column or that move through the food web than contaminants in the sediments. Benthic organisms (e.g., macroinvertebrates) are more susceptible to exposures from direct contact with sediments than organisms that live in the water column.

Summary of Potential Exposure Pathways - Ecological exposure pathways are limited for soil at the SWP Site due to the surface soil removal actions, and the maintenance activities that should reduce foraging and nesting activities by terrestrial organisms. Aquatic organisms may be exposed to contaminants in ground water via transport to surface water. However, ground-water flow to Chattanooga Creek will be intercepted as required to prevent releases of site-specific constituents into Chattanooga Creek above accepted aquatic water quality standards. The GWPS presented in this permit are specifically designed to be protective of both human and ecological receptors. Therefore, application of the GWPS will serve to limit future ground-water to surface water transport to concentrations below those that might potentially impact aquatic species.

5.4 CONCLUSIONS

As demonstrated in the above sections, the following conclusions are made regarding current site risk:

Exposures are considered limited for the following exposure scenarios:

- 1. Worker exposures to surface, submerged, and subsurface soil at the SWP site;
- 2. Terrestrial ecological receptor exposures to soil at the SWP site; and
- Aquatic ecological receptor exposure to surface water contaminated by migration of ground water with wood preserving constituents from the SWP site in the portion of Chattanooga Creek adjacent to the SWP site.

For these limited exposure pathways, SWP believes that no further evaluation of risk is necessary. For receptors and exposure pathways concluded to be limited, the primary corrective measures objective of protection of human health and the environment is met since site risk for that receptor and exposure pathway is controlled.

Given current site use and controlled future use of the SWP Chattanooga, Tennessee site, the corrective measures and engineering controls implemented (described in Section 4.0) will address or have effectively addressed risk and thus meet corrective measures objectives for the site. The site controls and implemented corrective measures have helped eliminate or control exposure to site contamination and thus are considered to be the selected alternatives for addressing site risk.

6.0 RECOMMENDATION FOR A FINAL CORRECTIVE MEASURE ALTERNATIVE EVALUATION

As discussed in Section 4.0, completed stabilization measures and available ground-water remediation/migration control systems at the SWP Chattanooga site consist of:

- Source control SWP has performed source removal to the extent practical in areas with heavily contaminated soil to address leaching to ground water and exposure to contaminated surface soil.
- Ground-water interception/recovery SWP can prevent off-site migration of contaminated ground
 water by operating a ground-water recovery system near the downgradient edge of the property.
- Site Controls SWP has secured the site relative to public access and is committed to restricting
 potential site use by maintaining ownership of the property.

As demonstrated in the site risk evaluation, these implemented corrective measures meet the corrective measures objectives for the site, which are: 1) protection of human health and the environment, 2) achieve media cleanup objectives appropriate to the assumptions regarding current and reasonably expected land use(s) and current and potential beneficial uses of water resources, and 3) remediate the sources of releases so as to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. In addition, operation of the available ground-water remediation/migration control systems (i.e., DNAPL removal and ground-water recovery and treatment) comply with applicable standards for management of wastes and are cost effective solutions for the environmental concerns present at the site.

For the reasons stated above, SWP recommends that the corrective measures implemented and available at the site be selected as the Final Corrective Measure Alternative for the SWP Chattanooga, Tennessee facility.

7.0 POST-CLOSURE PLAN AND FINANCIAL REQUIREMENTS

7.1 POST-CLOSURE NOTICES

The surface impoundment, containing USEPA listed Hazardous Waste "K001", was closed under the approved closure plan and a Closure Certification Report was submitted to TDEC on September 10, 1987.

In accordance with TN 1200-1-11.06(7)(j), a notice was submitted to the local land authority on September 29, 1993.

A Notice in Deed was filed on October 31, 1988 notifying any potential purchaser that:

- 1. The property has been used to manage hazardous waste.
- 2. Use of the land is restricted to activities that will not disturb the integrity of the final cover system or monitoring system during the post-closure care period.

A certification document signed by SWP and an independent PE registered in the State of Tennessee was submitted to the department. This document stated that post closure care was performed in accordance with the approved closure. A letter stating the certification was found to satisfy the requirements of the Rule 1200-1-11-.05(7)(f) of the "Rules Governing Hazardous Waste Management in Tennessee" was received January 28, 1988.

7.2 INSPECTION PLAN

The closed regulated unit will be monitored and maintained throughout Post-Closure Care period. Activities will consist of periodic inspections and maintenance of all observable features as per TN 1200-1-11.06(7)(h)2. Inspection items include:

- closed surface impoundment cover for structural integrity and surface protection;
- integrity of ground-water monitoring wells;
- security of WMA; and
- permanent site benchmarks.

These inspections will be made by SWP trained personnel at least quarterly (monitoring wells) and after major storm events (regulated unit integrity, etc.). Copies of the inspection checklists for the regulated unit and site monitoring wells are included in Appendix E. The purpose of these checklists is to assist the inspector in noticing particular items during the facility inspections including ground cover maintenance. The following sections describe the general procedures which will be followed during the post-closure care period.

Inspection and monitoring will continue throughout the post-closure period or until SWP receives approval from TDEC to discontinue the program. Inspection records will be maintained on-site for a period of 5 years after the date of inspection. In addition, the inspection records will be kept at the Spartanburg headquarters for a period of 5 years after the end of the post-closure care period.

7.3 GROUND-WATER MONITORING PLAN

As previously described (Section 3.1), creosote constituents associated with releases from the past wood-treating operations have been detected in ground water at the SWP Chattanooga Site. SWP will continue compliance monitoring under TN Rule 1200-1-11.06(6)(j) to determine whether releases from the regulated units within the waste management area are causing an exceedence of Ground Water Protection Standards (i.e., concentration limits established in accordance with TN Rule 1200-1-11.06(6)(e)) at the point of compliance (POC). This compliance determination will establish the need for operation of the existing, in-place ground-water corrective action system. If non-compliance with the Ground Water Protection Standards is determined for any well along the POC and the ground-water corrective action system (pumping from drip-track area trench and downgradient interceptor trench near Chattanooga Creek) is initiated, the compliance monitoring program will be used to monitor effectiveness of the corrective action (in conjunction with ground-water flow direction monitoring) in accordance with TN Rule 1200-1-11.06(6)(k)4.

Thirty-three site-specific monitoring constituents (constituents of concern) have been identified, as described in Section 3.1.2. Ground Water Protection Standards (GWPS) have been developed for these thirty site-specific monitoring constituents, as described in Section 4.3.1. Table 7.1 lists each of the identified, site-specific monitoring constituents and the associated GWPS for each constituent.

As discussed in section 3.1.3, the nature (creosote constituents) and extent of ground-water contamination are such that a Waste Management Area (TN Rule 1200-1-11.06(f)2.(ii)) approach for compliance monitoring is appropriate for the SWP Chattanooga Site. Ground-water contamination associated with releases from individual units (HWMU and SWMUs) cannot be isolated to individual release areas; i.e., a single, co-mingled plume of ground-water contamination exists within the waste management area. The point of compliance (POC) has been defined per TN Rule 1200-1-11.06(f)1. to be located at the hydraulically downgradient limit of the waste management area as shown on Figure 1-1.

7.3.1 Description of Wells

With the exception of a proposed cluster of two new monitoring wells in the area of the existing C-7 cluster, a sufficient number of wells exist at appropriate locations and depths along the POC to yield ground-water samples from the uppermost aquifer that represent the quality of ground water passing the POC (TN Rule 1200-1-11.06(j)2.). These POC monitoring wells are identified as:

POC MONITORING WELLS

Soil Unit	Fractured Rock Unit
C-5	C-5A
C-6	C-6A
C-7(R)	C-7A (R)
C-36	C-12A

7.3.2 Sampling and Analysis Plan

Samples will be obtained from the POC wells semi-annually during the remaining 20-year compliance period. The samples will be analyzed in the laboratory for the site-specific constituents identified on Table 7-1. The field sampling and laboratory analyses procedures will be as described in Appendix E.

In addition to compliance sampling at the POC, SWP will sample internal WMA wells U-4B (soil unit) and U-4A (fractured rock unit) semi-annually. The samples from these wells will be analyzed for the site-specific constituents (Table 7-1). These internal wells are located downgradient of the most upgradient group of hazardous/solid waste management units (HWMU and SWMUs No. 6, 8, 17 and 25) and will allow monitoring of ground-water quality trend as an indication for the need of operating the existing

recovery system in the drip track area. SWP will evaluate constituents detected at U-4A and U-4B above the GWPS relative to a trend of increasing constituent concentrations using the nonparametric Mann-Kendall test for trend. This test is used to evaluate whether an upward or downward trend in concentrations of a single well exists over time. These concentration trends will be evaluated over time and presented in annual reports (see Section 7.3.4). SWP will initiate operation of the drip track area recovery system when an increasing concentration trend for a constituent which is above the GWPS has been confirmed by resampling (within 30 days) and the nonparametric test for trend. The drip track area recovery system will be operated until a decreasing trend in constituent concentrations above the GWPS is confirmed.

Ground-water elevations will be obtained at all accessible site monitoring wells during the semi-annual sampling of the POC wells. These elevations will be used to provide the annual determination of the ground-water flow rate and direction as required by TN Rule 1200-1-11.06(j)5. If the ground-water corrective action system, or a portion thereof, has been initiated as indicated by an exceedence of GWPS at the POC, the ground-water flow direction will be determined semi-annually to demonstrate the effectiveness of the activated system(s) in providing hydraulic control.

7.3.3 Statistical Procedures

A statistical interval method is appropriate when comparing compliance well concentrations with fixed limits. Statistical comparisons using either confidence or tolerance intervals will be used for the ground-water data collected at each of the POC wells to determine compliance with the GWPS for each constituent detected above GWPS at the POC in accordance with TN Rule 1200-1-11.06(6)(h)8 and 9.

Because of limited data available for most of the designated POC wells, SWP will generally consider analytical data collected under this permit to be the start point for the POC well data used for statistical analysis. At least four events of data are recommended for statistical evaluation, so until four sets of data are available, SWP will directly compare ground-water analytical results at each POC well to the respective GWPS for each constituent. If a constituent exceeds the GWPS at any POC well (confirmed by resampling within 30 days) during this interval, pumping at the intercept trench will be initiated and continued in operation until compliance is demonstrated (as discussed below in Section 7.3.4).

After four sets of data are available for each POC well, wells/constituents detected above the GWPS will

be evaluated statistically. Each data set will be reviewed for statistical outliers. The outlier test is described in the U.S. EPA Guidance (April 1989). A constituent concentration value that is significantly different (in orders of magnitude) from other data values in a set for the same constituent is defined by EPA as an "outlier" and should, therefore, not be used in the statistical analyses of that data set. In the case that an outlier is identified, SWP will attempt to determine the cause of the outlier (i.e., laboratory error, field label issues, etc.) and resample if appropriate. After evaluation for outliers, the distribution of the data set will be evaluated using a test of normality consistent with the size of the data set. Based on the distribution of the data set, a parametric or nonparametric interval analysis will be performed. The statistical evaluation will be performed within 45 days of receipt of analytical results and reported in annual reports (see Section 7.3.4).

7.3.4 Reporting

Compliance monitoring, including the statistical comparison with the GWPS and the annual flow rate and direction determination, will be reported annually in an Annual Ground-Water Quality Monitoring Report, unless the existing ground-water corrective action system has been put into operation. If ground-water corrective action has been initiated, based on a GWPS exceedence at a POC well, the ground-water quality and hydraulic control monitoring will be reported semi-annually in a Corrective Action Effectiveness Report. TDHE will be notified in writing within seven days of determining that the GWPS for one or more constituents has been statistically exceeded. At the time of this notification, SWP may perform re-sampling of the well with exceedence to verify that the exceedence is not due to laboratory error. Once confirmed that an exceedance has occurred, pumping from the downgradient intercept trench will be initiated. This pumping will not be interrupted (barring routine system downtime, maintenance or creek flooding) until statistical evaluation of the data from the POC wells demonstrate compliance (TN Rule 1200-1-11.06(6)(k)5(iv). Once operation of pumping from the downgradient intercept trench is initiated, SWP may increase the frequency of monitoring at POC wells to statistically demonstrate compliance.

7.4 MAINTENANCE PLAN

This section of the Post-Closure Care Plan addresses maintenance of the closed surface impoundment in the following areas:

1. Maintenance and Repair of the Final Cover

The cover will be inspected quarterly and after all major rainfall events throughout the post-closure care period. Inspections will include checks for consistency of the soil cover, erosion, depressions in the cover due to differential settlement, woody plant infiltration, and other elements of the system which may adversely affect the performance of each cover.

2. Run-on/off Control System

Run-on and run-off control is provided for the closed unit by elevation of the cover above the surrounding area and the slopes provided at the surface of the cover. Maintenance of the grassed condition of the cover surface will control run-off as well as erosion. The ditches around the unit will be inspected to assure they are clean and clear of any debris and that rip rap is in place.

3. Ground-Water Monitoring System

Ground-water monitoring wells will be inspected quarterly to verify that accessible parts of the wells, including the outer casing and cap, lock, apron, inner casing and cap, measuring point, and well identification number are maintained.

4. Vegetative Cover

The surficial cover is grassed. Fertilizer and seed will be applied as needed to provide a continuous grass cover as a deterrent to erosion.

Post-closure care will include mowing the grass of the covers at least four times per year. Clippings will be left in place to provide nutrients and organic matter and to promote erosion control.

7.5 POST-CLOSURE SECURITY

Access to the SWP-Chattanooga site by unauthorized personnel is minimized, per requirement of TN 1200-1-11.06(2)(e). Part of the site is enclosed by a chain-link fence with a locking gate. The east end of the site has Chattanooga Creek for a border. An employee of SWP is on-site during regular business hours. When an employee is not present, the gate is locked.

Warning signs are posted at the gate, as well as on the fence surrounding the property, with the legends "DANGER – ADMITTANCE TO AUTHORIZED PERSONNEL ONLY" and "DANGER – UNAUTHORIZED PERSONNEL NO ENTRY ALLOWED." The signs are legible from a distance of 25 feet. The fence will be repaired or replaced as deemed necessary.

All buildings on-site are equipped with an electronic security system by Sonitrol. When armed after hours, the system monitors for unauthorized entry to the building by using detectors for when a door is

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SWP Chattanooga, TN 2001 Part B Permit Renewal Application

opened, sound level detectors for breaking glass and motion detectors. In the event of an alarm from one

of the above sources, the system allows audio monitoring of the building from the Sonitrol offices.

The buildings are monitored at all times for fire conditions by Sonitrol. Monitors indicate the presence

of smoke, extreme heat, and also provide an alarm based on an excessive rate of the rise of temperature

in the building.

POST-CLOSURE CONTACT 7.6

The current site contact is:

Jimmy L. Hudson

400 W. 33rd Street

Chattanooga, Tennessee 37410

Office Telephone: 423-266-5628

Facsimile Number: 423-267-7190

Mobile No: 423-593-8581

7.7 POST-CLOSURE COST ESTIMATE

The post-closure cost information is submitted in accordance with requirements of 40 CFR 264.144. An

estimated \$3,055,001.40 (cost estimate in 2001 dollars) will be needed for post-closure inspections and

maintenance procedures over the remaining post-closure care period. The post-closure costs are

presented by activity in Table 7-2.

This post-closure cost estimate will be kept on file by SWP. The cost estimate will be adjusted annually

by March 31. Whenever a change in the post-closure plan affects the cost of post-closure, the cost

estimate will be adjusted within 30 days after the revision to the post-closure plan in accordance with 40

CFR 264.144(c). SWP is providing financial assurance by corporate guarantee (bond rating) in

accordance with requirements of 40 CFR 264.145.

7.8 FINANCIAL ASSURANCE MECHANISM FOR POST CLOSURE

The financial assurance for post closure care is guaranteed through the corporate guarantee specified in

Tennessee Rule 1200-1-11.05(8) and 1200-1-11.06(8).

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8.0 REFERENCES

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- Law Engineering and Environmental Services, Inc., 1997. Dye Tracer Study Report, Velsicol Chemical Corporation, Chattanooga, Tennessee.
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- USEPA, 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, USEPA No. 540/1-89/002.
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RCRA PART B POST-CLOSURE PERMIT RENEWAL APPLICATION FOR SWP - CHATTANOOGA, TENNESSEE SITE

VOLUME I – TEXT, TABLES, AND FIGURES

RCRA PART B
POST-CLOSURE PERMIT RENEWAL APPLICATION
FOR
SWP - CHATTANOOGA, TENNESSEE SITE
VOLUME II – APPENDICES
MAY 2001

CFR 264.144(c). SWP is providing financial assurance by corporate guarantee (bond rating) in accordance with requirements of 40 CFR 264.145.

7.8 FINANCIAL ASSURANCE MECHANISM FOR POST CLOSURE

The financial assurance for post closure care is guaranteed through the corporate guarantee specified in Tennessee Rule 1200-1-11.05(8) and 1200-1-11.06(8).

8.0 REFERENCES

- Dafferner, A.T., 1988. Letter to Sidney Brandwein dated August 15, 1988.
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- Southern Wood Piedmont Company, 2001a. Stormwater Monitoring Report for the Tennessee General NPDES Permit for Stormwater Discharges Associated with Industrial Activities, Permit No. TNR 051832, January 19, 2001.
- USEPA, 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, USEPA No. 540/1-89/002.
- USEPA, 1992. Chattanooga Creek Sediment Profile Study, Chattanooga, Tennessee, April/August 1992.
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TABLE 2-1

SOLID WASTE MANAGEMENT UNIT SUMMARY TABLE SWP - Chattanooga

		1		1		1		
SWMU Number	SWMU Identification	SWMU Description	Dates of Operation	Preliminary Assessment Results	Confirmatory Sampling Results		Corrective Action	References
1	Rainwater Pond (1A)	750,000 gallon capacity pond that received stormwater run-off. Stormwater was diverted from Pond 1A in 1995 and the pond is no longer in use.	1976-1995	The RFA recommended a confirmation that the bentonite liner in the pond had not been penetrated by waste. Potentially affected media included ground-water and soil. The HSWA permit required confirmatory sampling. No ground-water contamination associated with this unit was indicated by over 12 years of monitoring data collected from monitoring wells C-5 and C-5A.	below the bottom of the pond at five locations. Results	construction worker or tresp	e human exposure pathway is exposure to submerged soil for ssers during draining and filling. Access to the site is restricted tial trespassers until pond is filled with clean soil. The pond will bottom sediment and filling. Exposure during removal of bottom inate pond will be controlled by using PPE for construction endix A.	
		500,000 gallon capacity pond that received water from Pond 1A. Use of the pond was discontinued in 1995.	1976-1995	The RFA recommended a confirmation that the bentonite liner in the pond had not been penetrated by waste. Potentially affected media included ground-water and soil. The HSWA permit recommended confirmatory sampling. No ground-water contamination associated with this unit was indicated by over 6 years of monitoring data collected from monitoring wells C-4 and C4A.	from four locations below the bottom of the pond	construction worker or tresp to prevent exposure to pote be eliminated by removal of	inate pond will be controlled by using PPE for construction	a, b, c, g
2		210,000 gallon capacity pond that received surface water run-off. Stormwater was diverted from Pond 2A in 1995 and the pond is no longer in use.	1976-1995	The RFA recommended a confirmation that the bentonite liner in the pond had not been penetrated by waste. Potentially affected media included ground-water and soil. The HSWA permit recommended confirmatory sampling. Groundwater monitoring was not performed downgradient due to the proximity of Chattanooga Creek and the associated DNAPL at top of rock.	Soil samples were taken at 0-6" and 12-18" below the pond bottom at three locations. Results indicated the	construction worker or tresp to prevent exposure to pote be eliminated by removal of	e human exposure pathway is exposure to submerged soil for ssers during draining and filling. Access to the site is restricted tial trespassers until pond is filled with clean soil. The pond will bottom sediment and filling. Exposure during removal of bottom inate pond will be controlled by using PPE for construction endix A.	a, b, c, g
4		140,000 gallon capacity pond that received water from Pond 2A. Use of the pond was discontinued in 1995.	1976-1995	The RFA recommended a confirmation that the bentonite liner in the pond had not been penetrated by waste. Potentially affected media included ground-water and soil. The HSWA permit recommended confirmatory sampling. Groundwater monitoring was not performed downgradient due to the proximity of Chattanooga Creek and the associated DNAPL at top of rock.	pond bottom at three locations. Results indicated the	construction worker or tresp	inate pond will be controlled by using PPE for construction	
5	Closed RCRA Pond (3A)	Process wastewater treatment pond containing K001 waste.	1976-1987	This pond was a Hazardous Waste Management Unit and was closed under an agency approved closure plan in 1987.	bottom of fill material after removal of visible stained	construction worker or tresp to prevent exposure to pote be eliminated by removal of	bottom sediment and filling. Exposure during removal of bottom inate pond will be controlled by using PPE for construction	
6	Rainwater Pond (3B)	310,000 gallon capacity pond that receive stormwater run-off (potentially contaminated with creosote). Collected rainwater run-off in Pond 3B above the bottom of the sump connected to the pond is currently pumped to the POTW discharge point.	1976-present	The RFA described ground water as the potential pathway of migration and recommended continued ground-water monitoring in the area. The 1991 HSWA Permit identified soil and ground water as potentially affected media and recommended confirmatory sampling. Pond 3B was drained and the visually contaminated sediments removed in July 1986 in conduction with preparation for closure of adjacent pond 3A.	the pond at three locations, after removal of visiting to contaminated sediment in 1986. Results indicated the	conduction with preparation human exposure pathway draining and filling. Acce trespassers. The pond will	the visually contaminated sediments removed in July 1986 in for closure of adjacent pond 3A. The only potentially complete is exposure to submerged soil for costruction worker during is to the site is restricted to prevent exposure to potential be eliminated by filling with clean soil. Exposure during filling PE for construction workers as described in Appendix A.	a,b,c,g
7	Landfill	Scrap wood, tires, and other building materials were deposited in this area.	1950-1976	The RFA identified groundwater as the potential migration pathways and suggested groundwater monitoring. The HSWA permit identified groundwater, surface water, and soil as potentially affected media. Soil, groundwater, and surface water were addressed in previous assessment activities conducted since 1981. Corrective action was initiated in 1989 in conjunction with cleaning and filling the CERCLA reported pond.	Samples were taken during closure below the bottom	separated from the contame surface run-off, and ground- oil/water separator to the F	ed soil remaining in the area was removed. Large debris was nated material and washed within the pond area. Washwater, water seepage were collected in a sump and pumped through an OTW. Clean soil fill was placed in the pond area, and an oil within the pond limits. In 1991, SWP installed a groundwater at tof SWMU 11.	a, b, c, d, e, g
8	Railroad Tracks/Drip Area/Creosote Spill Area	This area received drippage from freshly treated wood products.	1925-1988	Test pits and soil borings were installed in 1986 and 1989 to evaluate the nature and extent of visually contaminated soil in the drip track. Results indicated that the ballast was visually contaminated, DNAPL existed at the ballast/clay interface, and DNAPL was present at the soil/rock interface.	fill material at 7 locations of the track. Results	removed and covered with of DNAPL at the soil/rock inte trench installation, the soil/recovery trench at low poin pathway is exposure of couthe level of previous remova	ck interface was delineated. Four sumps were installed in the	a, b, c, d, e, g
9	Closed Concrete Settling Basin	Used to settle creosote contaminated wastewater. Unit was removed and the area was covered with gravel.	1966-1987	No further action required by EPA HSWA permit TND-003-327-400.				
10	Tank Farm	150,000 gallon wastewater tank	1940-1988	No further action required by EPA HSWA permit TND-003-327-400.				
		Swampy, unlined pond that received process plant effluent, contained treated wood, metal and tires	1960-1977	The RFA and HWSA permit identified this SWMU as having a high potential for releases to groundwater. Assessment activities including soil and groundwater sampling were performed at the site. Five soil borings and 13 hand auger borings were installed to determine the extent of oil in the subsurface. Oil was noted in each of the test borings.		oil/water separator and the soil were then removed fro	med in 1989. Surface water was pumped from the area to an discharged to the POTW. DNAPL and visually contaminated the bottom of the pond and clean backfill was placed. An oil within the pond limits. In 1991, SWP installed a groundwater of SWMU 11.	a, b, d
11	CERCLA Reported Pond	l						

TABLE 2-1

SOLID WASTE MANAGEMENT UNIT SUMMARY TABLE SWP - Chattanooga

	<u></u>						77		
	WMU Number	SWMU Identification	SWMU Description	Dates of Operation	Preliminary Assessment Results	Confirmatory Sampling Results		Corrective Action	References
	12	Treated Wood Storage Area	Storage area for treated wood	1950-1988			substantane soil during inte	exposure pathway is exposure of a construction worker to usive work. Corrective action includes PPE for construction	a, b, c, g
	13		Received process plant effluent after pre- treatment in flume, allowed effluent to flow back to Chattanooga Creek	1925-1940 (approximately)	The RFA described this SWMU as having a high potential for releases to surface and ground water. The RFA recommended continued ground-water monitoring of the area. Assessment activities at this site include soil sampling, groundwater monitoring, and surface water sampling. Surface water samples collected in 1985 did not contain site specific constituents. DNAPL and site specific constituents have been detected in wells within the SWMU. There does not appear to be constituent migration downgradient of the SWMU.	Soil samples were taken 0-6" and 12-18" below ground surface at 6 locations. Results indicated the presence of extractable organic compounds with samples from 12 to 18" exhibiting higher concentrations than the 0 to 6" samples. Volatile organic compounds were detected in one soil sampling location.	and subsurface soil during a construction workers, site	posure pathway is exposure of a construction worker to surface nd exposure of trespassers. Corrective action includes PPE for superintendant and subcontractor during well sampling and access. A groundwater intercept trench was installed along nt migration of contaminated ground water from this SWMU.	a, b, c, d, g
	14	Sand Filter/Aerated Clarifier	NA	NA	The RFA record review and site inspection did not provide sufficient evidence of contamination to warrant further investigation. It was discovered that the unit was proposed				е
	15	Closed Concrete Cooling Pond	Cooling Pond	1950-1987	Only and never constructed The RFA record review and site inspection did not provide sufficient evidence of contamination to warrant further investigation. No further action required by EPA HSWA permit TND-003-327-400.				b, e
	16	Solvent Storage Tank	Two 20,000 gallon storage tanks containing xylenes or naphtha	1972 - 1988	The RFA record review and site inspection did not provide sufficient evidence of contamination to warrant further investigation.				е
			Storage area for treated wood	1950-1988	Creosote constituents may be present in this area as a result of drippage from the treated wood. The RFA recommended continued ground-water monitoring of the area. The HSWA permit identified the SWMU as requiring confirmatory sampling.		subsurface soil and exp construction workers, dust maintaining site vegetative sampling and inspection, a track ground-water/DNAPL	exposure pathway is exposure of workers to surface and sure of trespassers. Corrective action includes PPE for control during site disturbance, dust mask during mowing, over, PPE for site superintendant and subcontractor during well nd restricted access. Corrective measures, including the drip collection trench immediately downgradient of this unit and the th near Chattanooga Creek, have addressed the ground-water	a, b, c, d, g
\Box	17	Treated Wood Storage Area Pond	NA	NA	No further investigation recommended in the RFA. Pond was shown on map, but not apparent during RFA site visit.			14 744 47	е
	19	Natural Pond	Pond	NA		One composite sediment sample was taken at 0-6" from 3 locations in the pond and one surface water sample was collected. The sediment sample contained extractable organic compounds and volatile organic compounds. Surface water results were non-detect for extractable and volatile organic compounds.	costruction worker during i	te human exposure pathway is exposure to submerged soil for htrusive activities and trespassers. Corrective actions include is and restricted access. A groundwater intercept trench was Creek to prevent migration of contaminated ground water from	a, b, c, d
	20	Pond	NA	NA	No further investigation recommended in the RFA. Pond was shown on map, but not apparent during RFA site visit.				е
	21	Switch Tie Storage Area	Storage area for treated switch ties	1970-1988	Air, surface water and ground water were identified as the potential pathways of migration. The RFA suggested continued ground-water monitoring. Ground-water monitoring did not detect any site specific constituents. The HSWA permit identified this SWMU as requiring confirmatory sampling.	of volatile organic compounds and extractable organic	exposure of trespassers. (control during site disturban	exposure pathway is exposure of workers to surface soil and corrective action includes PPE for construction workers, dust ce, dust mask during mowing, maintaining site vegetative cover, t and subcontractor during well sampling and inspection, and	a, b, c, f
	22	Mislabeled Number in RFA	NA	NA	NA	NA .	NA		е
	23	Landfill Area	Uncovered ash observed in area	1940-1955	The RFA record review and site inspection did not provide sufficient evidence of contamination to warrant further investigation. No further action required by EPA HSWA permit TND-003-327-400.				a, b, e
	24		Dump area with waste materials observed on slope toward Chattanooga River in 1987	Unknown to 1980	The RFA identified this area as having a medium potential migration pathway for surface and ground-water. Further evaluation of wastes was recommended. The HSWA permit identified this area as requiring confirmatory sampling.	Six soil samples were taken from four locations at depths ranging from 0 to 18" below ground surface. Results indicated the presence of extractable organic compounds with concentrations decreasing with increasing depth. Volatile organic compounds were not detected.	substitution soil during inte	exposure pathway is exposure of construction worker to susive work. Corrective action includes PPE for construction	
	25		This concrete lined drainage ditch/culvert transported contaminated surface run-off from the plant area to Pond 1A.	1950-1976	famecting surface water, ground-water, and soil and required confirmatory sampling.	36" to 48" adjacent to the bottom of the ditch at 2 locations. Results indicated the presence of extractable organic compounds. Volatile organic compounds were not detected.	subsurface soil during intru- and restricted access.Corre collection trench immediate	exposure pathway is exposure of construction worker to ive work. Corrective action includes PPE for construction worker ctive measures, including the drip track ground-water/DNAPL y downgradient of this unit and the ground-water intercept trench ve addressed the ground-water exposure pathway at the site.	a, b, c, d, e, f
	26	Wastewater Treatment Unit	Self-contained wastewater treatment unit	1986-1988	The RFA recommended no further investigation. No further action required by EPA HSWA permit TND-003-327-400	Confirmatory sampling was not required.			b, e
			(received process wastewater Area where treated wood was stored for	1925-1988	The RFA record review and site inspection did not provide sufficient evidence of				h .
	27		transit.	1929-1900	contamination to warrant further investigation. No further action required by EPA HSWA permit TND-003-327-400.	Committatory sampling was not required.			р, е

TABLE 2-1

SOLID WASTE MANAGEMENT UNIT SUMMARY TABLE SWP - Chattanooga

SWMU Number	SWMU Identification	SWMU Description	Dates of Operation	Preliminary Assessment Results	Confirmatory Sampling Results		Corrective Action	References
28	Sawdust Storage Area	Unit that produced sawdust for fuel.	Unknown to 1988	The RFA recommended no further investigation. No further action required by EPA HSWA permit TND-003-327-400.	Confirmatory sampling was not required.			b, e
29	Wood Treatment Vessel Pit/Associated Process Area	The wood treatment vessel was used to pressure treat wood with creosote. A concrete sump collected spillage for recycling.	1925-1988	The RFA recommended continued monitoring for air releases from this unit. The 1991 HSWA Permit identified this area as needing confirmatory sampling.		only potential human exposoril during intrusive work	and covered in 1989 to prevent direct exposure to the soil. The sure pathway is exposure of construction worker to subsurfact. Corrective action includes PPE for construction worker and	
30	Natural Pond 2	Pond	NA NA	No further action required by the EPA HSWA permit TND-003-327-400.	Confirmatory sampling was not required.			b
	Additional Mixed Wood Handing	Vicinity north of process plant. Used for storage of treated wood products	Unknown to 1988	This area was identified as requiring confirmatory sampling in comments from EPA dated	A total of sixteen grab soil samples were collected a depths of 0 to 6" and 12 to 18". EOCs were detected in several samples. VOCs were detected in one surface soil sample.	subsurface soil and ex construction workers, dus maintaining site vegetative sampling and inspection, a	in exposure pathway is exposure of workers to surface are repaire of trespassers. Corrective action includes PPE for sit control during site disturbance, dust mask during mowing tover, PPE for site superintendant and subcontractor during we have restricted access.	or g, c, g ell
		Vicinity south of process plant. Used for storage of treated wood products	Unknown to 1988	This area was identified as requiring confirmatory sampling in comments from EPA dated May 14, 1993.	A total of ten grab soil samples were collected a depths of 0 to 6" and 12 to 18". EOCs were detected in	t subsurface soil and ex construction workers, dus maintaining site vegetative	in exposure pathway is exposure of workers to surface are posure of trespassers. Corrective action includes PPE first control during site disturbance, dust mask during mowing ever, and restricted access. A groundwater intercept trench was Creek to prevent micration of contaminated ground water from	or g,c,d,g as

a) Compilation of Assessment and Corrective Action Activities at the Chattanooga, Tennessee Facility, Southern Wood Piedmont, November 6, 1002

f) Environmental Indicator (EI) - Current Human Exposures Under Contrl, USEPA.

Prepared by/Date: EMM 5/25/01 Checked by/Date: MAB 5/25/01

b) HSWA Permit #TND-003-327-400, USEPA, March 4, 1993.

c) Confirmatory Sampling Report, Southern Wood Piedmont, May 10, 1994.

d) On-Site Stabilization Report, Southern Wood Piedmont, June 7, 1993

e) RCRA Facility Assessment, Tennessee Department of Health and Environment, July 22, 1987.

TABLE 3-1 MEASUREMENTS OF ACCUMLATION OF DNAPL IN MONITORING WELLS Southern Wood Piedmont Chattanooga, Tennessee

Selfa 14.			Height of DNA	PL Column (Ft	.)
	Semiannual #1	Baseline	Semiannual #2	Semiannual #1	Semiannual #2
Well	5/24-25/99	08/09-10/99	11/29-30/99	05/08-09/00	10/11-12/00
C-1A	2.11	2.20	2.20	2.79	2.39
C-7	*	*	*	*	*
C-7A	Trace	Trace	Trace	Trace	Trace
C-7B	*	*	*	*	*
C-11A	*	Trace	Trace	*	*
C-13B	Trace	Trace	Trace	Trace	Trace
C-24A	66.81	45.02	45.13	44.75	45.82
C-25A	Trace	0.15	0.15	0.47	0.52
C-26A	11.83	20.89	21.08	21.39	18.50
C-27A	39.40	32.73	32.29	25.57	31.96
C-28A	*	11.75	12.12	12.31	11.79
L-3A	1.11	1.12	1.01	Trace	0.91
L-3C	2.24	2.04	Trace	Trace	3.93
L-4A	Trace	*	*	*	*
L-4B	Trace	Trace	Trace	Trace	Trace
L-4C	*	*	*	*	*
S-1A	*	*	*	*	*
S-1B	Trace	Trace	Trace	Trace	Trace
WL-1	Trace	0.80	0.71	0.62	0.53
WQ-2	5.03	4.11	3.65	3.81	5.17
WQ-2B	Trace	Trace	Trace	Trace	Trace
WQ-3	Trace	0.27	Trace	Trace	0.18
WQ-5	Trace	0.42	0.32	0.23	0.07

^{*} Not measured or no DNAPL observed.

Trace Indicates only a small amount of oil was present but not measurable.

Site Specific Constituents Identified in Ground Water at SWP Chattanooga Site

PHENOLICS:

- 2, 4 Dimethylphenol
- 2 Methylphenol
- 3 Methylphenol
- 4 Methylphenol

Phenol

SINGLE-RING AROMATICS:

- 1, 2 Dimethylbenzene
- 1, 3 Dimethylbenzene
- 1, 4 Dimethylbenzene

Benzene

Ethylbenzene

Styrene

Toluene

LIGHT AROMATICS:

2 - Methylnaphthalene

Acenaphthene

Acenaphthylene

Anthracene

Dibenzofuran

Fluoranthene

Fluorene

Naphthalene

Phenanthrene

Carbazole

HEAVY AROMATICS:

Benzo (a) anthracene

Benzo (a) pyrene

Benzo (b) fluoranthene

Benzo (k) fluoranthene

Chrysene

Dibenzo (a, h) anthracene

Ideno (1, 2, 3 - cd) pyrene

Pyrene

INORGANICS:

Sulfide

Arsenic

Chromium

PREPARED/DATE: MAB 5/25/01 CHECKED/DATE: SEB 5/25/01

TABLE 3.3

RESULTS OF SOIL CHEMICAL ANALYSIS FROM TEST PITS (ppm)
SOUTHERN WOOD PIEDMONT - CHATTANOOGA, TENNESSE FACILITY

]	T				K001 PARAMETERS														
TEST PIT NO.	DEPTH	TOTAL PHENOL ppm	TOLUEN % H ₂ O	NE EXTRAC	CTION %	2-CHLORO- PHENOL	PHENOL	1	2,4,6- TRICHLORO- PHENOL	P-CHLORO- M-CREOSOL	TETRA- CHLORO PHENOL		NAPH- THALENE	ACE- NAPHTHENE	PHENANTHRENE & ANTHRACENE			FLUORAN-	BENZO(A) PYRENE	IDENO (1,2,3-CD)PYRENE & DIBENZA(A,B) ANTHRACENE	CARBAZOLE
T-5	0 - 3' 6"	0.22	21.33	0	79.02	<0.2	<0.2	<0.1	<0.4	<0.3	<0.4	<0.7	<0.1	<0.1	0.2	<0.1	<0.2	<0.2	<0.2	<0.4	<0.2
T-7	0 ~ 1' 6"	0.22	21.70	0	78.72	<0.7	<0.7	<0.6	<1.0	<1.0	<1.0	<4.0	<0.4	<0.4	3.7	4.2	3.8	4.4	2.2	<1.0	0.6
T-9	0 - 6"		20.50	1.09	78.41	<1.5	6.1	<1.3	<2.5	<2.7	<2.5	<10.0	5.7	26.0	560.0	250.0	120.0	49.0	44.0	14.0	55.0
T-11	0 - 2'	0.10	20.32	0	80.00																
T-12	0 - 1' 6"	0.30	19.67	0	80.91	<0.2	<0.2	<0.1	<0.4	<0.3	<0.4	<0.7	<0.1	<0.1	0.2	<0.1	<0.2	<0.2	<0.2	<0.4	<0.2
T-13	0 - 1' 6"	0.32	15.36	2.63	82.01	#M.A			da — sh	= th-sp											
T-13	(Dupl)		16.82	2.36	80.82							4				or or one					
T-14	0 - 1'	0.06	17.17	0	83.24									***							
T-15	0 - 2'	0.79	24.28	0	76.18	*															
T-16	0 - 1' 6"	0.05	21.57	0	78.79	<0.2	<0.2	<0.1	<0.4	<0.4	<0.4	<0.7	<0.1	<0.1	0.2	<0.1	<0.2	<0.2	<0.2	<0.4	<0.2
T-17	0 - 2'	0.03	21.18	0	79.73													p - d- Al		and allows	
T-18	0 - 1' 6"	0.03	23.14	0	78.87							ماد									
T-19	0 - 1' 6"	0.02	22.96	0	80.79	<0.2	<0.2	<0.1	<0.4	<0.4	<0.4	<0.7	<0.1	<0.1	0.2	<0.1	<0.2	<0.2	<0.2	<0.4	<0.2
T-20	0 - 2'	distant	23.07	0	79.33							: - -	~~~			de all to					
T-20	(Dupl)		22.51	0	77.91											****					

T = Test Pit

< (less than) indicates method detection limit

SUMMARY OF CHEMICAL ANALYSES OF SOIL SAMPLES COLLECTED 8-18-86 DRIP TRACK AREA

SOUTHERN WOOD PIEDMONT - CHATTANOOGA, TN FACILITY

BORING NO:			DT-1					E	n-2			DI -3		DI-4			_	m -5					
DEFIH (FT):	2	7	12	17	22	27	7	12	19.5	24.5	4.5	9.5	2	7	12	2	7	12	22	27	DESECTION	Į	
ID:	6766A	6766C	6766E	6766G	6766I	6766K	6767C	6767E	676 7 G	6767I	6768C	6768E	6769A	6769C	6769E	6770A	6770C	6770E	6770I	6770K	LIMIT	ACCURACY	PRECISION
CONSTITUENT																							
HENOL GROUP (mg/kg)	_					:																	
2-CHLOROHENIL	ND	ND	ND	ND	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5 0.5	76% 31%	8.6% 5.1%
HENCL	ND	ND	ND	ND	ND	ND	ND	ND	ИD	ND	ND	ND	ND	ND	ND ND	ND ND	ND ND	2.0 3.9	ND ON	2.2 5.0	0.5	78%	18%
2,4-DIMETHYLHENIL	1.8	ИD	ИD	ND	ND	ND	ND	ND	ИD	ND	ND	ND ND	ND ND	ND ND	ND	ND	ND	ND	ND	ND	0.5	69%	5.5%
2,4,6-TRICHLORCHENIL	ND	NO	ND	ИD	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	818	14%
P-CHORO-N-CRESCL	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0	718	2.5%
TETRACHLOROHENOL 2.A-DINTEROHENOL	NO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	23%	9.1%
HNIACH CROHENCL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ИD	0.5	73%	10%
LICHT BAH GROUP (mg/kg)	- 8 . 6	1.1	1.1	5.5	2.3	1.2	6.5	26	1.3	иD	17 47	16 55	ND ND	4.5 ND	2.9 ND	ND ND	2.0 ND	1.2 ND	0.66 ND	3.5 ND	0.5 0.5	52 % 91%	194 168
ACENAHIHENE	ND	ND	ND	ND 7.0	ND	ND ND	0 .3 6	40 400	ND ND	ND ND	510	690	ND	ND	ND	ND	NO	ND	ND	ND	1.0	76%	27%
HENNIHRINE + ANIHRACENE	NO NO	ND ND	1.9	2.4	ND	ND	10	100	ND	ND	130	200	ND	ND	ND	NO	ND	ND	ND	ND	1.0	84%	7.4%
HEAVY BAH GROUP (mg/kg)	_															-		ND	ND	ND	1.5	80% 80%	6,5%
CHRYSENE + BENZ (A) ANIHAROEN		ND	ND	ND	ND	ИD	4.3	4.7 28	ND	ND	47 21	74 34	ND ND	ND	ND ND	ND	ND	NO NO	ND	ND	1.5	78%	10%
HENZO (B, K) FILURANIHENE	ND ND	2.2 ND	ND ND	ND ND	1.8 ND	ND ND	2.1 ND	28	ND ND	ND	10	15	NO	ND	ND	ND	ND	ND	ND	ND	1.0	73 8	10%
BENZO(A) PYRENE INDENO (1,2,3-CD) PYRENE	ND	MD	MD	ND	ND	N	140		10	.0	10											2.5	120
+DIBENZO (A, H) ANIH PAGENE	ND	ND	ND	ND	ND	ND	ND	5.4	ND	ND	3.7	6.9	ND	ND	ND	ND	ND	ND	ND	ND	1.5	76%	13%
CARBAZCLE	ND	ND	ND	ND	ND	ND	0.87	13	ND	ND	24	14	ND	ND	ND	ND	ND	ND	ND	ND	0.5	60%	118
					-	-		-															

Analysis by Savannah Laboratories using methods 8040 and 8100 as described in the edition of SW-846

CONFIRMATORY SAMPLING RESULTS SOUTHERN WOOD PIEDMONT CHATTANOOGA, TN

Sample	Sample	ed Wood Han Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
1A	S - G	0-6"	1/12/94	19.12	N
1C	S - G	12-18"	1/12/94	ND	N
2A	S - G	0-6"	1/12/94	ND	N
2C	S - G	12-18"	1/12/94	ND	N
3A	S - G	0-6*	1/12/94	28.04	0.008
3C	S - G	12-18"	1/12/94	89.9	N
4A	\$ - G	0-6"	1/12/94	21.21	N
4C	S - G	12-18"	1/12/94	33.03	N
5A	\$ - G	0-6*	1/12/94	9.62	N
5C	S - G	12-18"	1/12/94	2.37	N
6A	S - G	0-6"	1/12/94	70.76	N
6C	S - G	12-18"	1/12/94	ND	N
7A	S - G	0-6"	1/12/94	10.99	N
7C	S - G	12-18"	1/12/94	19.60	N
A8	\$ - G	0-6"	1/12/94	33.5	N
8C	S - G	12-18"	1/12/94	ND	N
9C	S - G - Dup (MWHA1-4C)	12-18"	1/12/94	19.08	N
Sample		MWHA2 ed Wood Hane Sample		Total Extractable	Total Volatile
Sample	Sample	ed Wood Hand Sample	Sample	Total Extractable	Total Volatile
Sample Location		d Wood Han	Sample Date	Total Extractable Organics (mg/kg) 171.1	Organics (mg/kg
Location	Sample Type	Sample Depth 0-6"	Sample	Organics (mg/kg)	Organics (mg/kg N
Location 1A	Sample Type S - G	ed Wood Hand Sample Depth	Sample Date 1/12/94	Organics (mg/kg) 171.1	Organics (mg/kg N N
Location 1A 1C	Sample Type S - G S - G	Sample Depth 0-6"	Sample Date 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310	Organics (mg/kg N N N
Location 1A 1C 2A	Sample Type S - G S - G S - G	Sample Depth 0-6" 12-18" 0-6"	Sample Date 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6	Organics (mg/kg N Ni Ni Ni
Location 1A 1C 2A 2C	Sample Type S - G S - G S - G S - G	Sample Depth 0-6" 12-18" 0-6" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND	Total Volatile Organics (mg/kg) Ni Ni Ni Ni
Location 1A 1C 2A 2C 3A	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51	Organics (mg/kg) Ni Ni Ni Ni
Location 1A 1C 2A 2C 3A 3C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51	Organics (mg/kg N N N N N N N N N N N N N N N N
Location 1A 1C 2A 2C 3A 3C 4A	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77	Organics (mg/kg N N N N N N N N N N N N N N N N N N N
Location 1A 1C 2A 2C 3A 3C 4A 4C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8	Organics (mg/kg) Ni Ni Ni Ni Ni Ni Ni
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77	Organics (mg/kg N N N N N N N N N N N N N N N N N N N
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58	Organics (mg/kg N N N N N N N N N N N N N N N N N N N
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 Sample	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58	Organics (mg/kg N N N N N N N N N N N N N N Total Volatile
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 Date	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg)	Organics (mg/kg N N N N N N N N N N N N Total Volatile Organics (mg/kg
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location 1C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/13/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg) 326.3	Organics (mg/kg N N N N N N N N N N N N O N O N O
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location 1C 2C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth 12-18" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/13/94 1/13/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg) 326.3 30.93	Organics (mg/kg N N N N N N N N N N N N O N O N N N N
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location 1C 2C 3C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth 12-18" 12-18" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/13/94 1/13/94 1/13/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg) 326.3 30.93 4847	Organics (mg/kg N N N N N N N N N N N O N N N N N N N
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location 1C 2C 3C 4C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth 12-18" 12-18" 12-18" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/13/94 1/13/94 1/13/94 1/13/94 1/13/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg) 326.3 30.93 4847 5.12	Organics (mg/kg) Ni
Location 1A 1C 2A 2C 3A 3C 4A 4C 5A 5C Sample Location 1C 2C 3C	Sample	Sample Depth 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" 0-6" 12-18" SWMU1 Sample Depth 12-18" 12-18" 12-18"	Sample Date 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/12/94 1/13/94 1/13/94 1/13/94	Organics (mg/kg) 171.1 2310 34.6 ND 0.51 ND 783.8 17.77 121.3 0.58 Total Extractable Organics (mg/kg) 326.3 30.93 4847	Organics (mg/kg N N N N N N N N N N N O N N N N N N N

Dans 4 of F

CONFIRMATORY SAMPLING RESULTS SOUTHERN WOOD PIEDMONT CHATTANOOGA, TN

		SWMU2			
	Ra	inwater Pon	d 1B		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
1C	S - G	12-18"	1/14/94	0.68	
2C	S - G	12-18"	1/14/94	0.67	N
4C	S - G	12-18"	1/14/94	ND ND	
5C	S - G	12-18"	1/14/94	0.46	
C1A	S - C	0-6"	1/14/94	1.70	N
		SWMU3	AL STREET		
	Rai	nwater Pond	i 2A		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
1C	S - G	12-18"	1/13/94	144.84	N
2C	S - G	12-18"	1/13/94	86.9	N
3C	S - G	12-18"	1/13/94	201.8	N
C1A	S - C	0-6*	1/13/94	27.61	N
Action along		SWMU4			
	Rai	nwater Pond	l 2B		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
1C	S - G	12-18"	1/13/94	0.74	0.007
2C	S - G	12-18"	1/13/94	7.07	N
3C	S - G	12-18"	1/13/94	1.97	N
C1A	S-C	0-6"	1/13/94	10.57	N
Objekti	dia kalika da sami Sidi kalika ikalika dikata	SWMU6			
	Rai	nwater Pond	l 3B		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1A	Sediment	0-6"	1/13/94	175.0	N
2A	Sediment	0-6*	1/13/94	469.7	N
3A	Sediment	0-6*	1/13/94	409.2	NI
4A	Sediment - G -Dup (SWMU6-2A)	0-6"	1/13/94	339.5	N
		SWMU8	8.7881 (1.6 ₆ . 1.11.383)		
	D	rip Track Are	99		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1D	S - G	6-6.5'	1/21/94	ND	NI NI
2D	S - G	36-48"	1/21/94	ND	NI
3D	S - G	36-48"	1/21/94	ND	NI
4D	S - G	36-48"	1/21/94	91.8	N
5D	S - G	42-48*	1/21/94	19.16	N
6D	S - G			20.42	NI NI
		54-60"	1/21/94	20.42 ND	
7D	S - G	42-48*	1/21/94		NI NI
8D	S - G - Dup (SWMU8-3D)	36-48*	1/21/94	2.22	N!

CONFIRMATORY SAMPLING RESULTS SOUTHERN WOOD PIEDMONT CHATTANOOGA, TN

	Dump Area (1A) - Tr	SWMU12 eated Wood S	Storage Are	ea (1C to 6C)	
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1A	S - G	0-6"	1/21/94	124.6	0.0421
1C	S - G	12-18"	1/21/94	25.9	NE
2A	S - G	0-6"	1/21/94	28.67	NE
2C	S - G	12-18"	1/21/94	ND	NE
3A	S - G	0-6"	1/21/94	ND	NÜ
3C	S - G	12-18"	1/21/94	ND:	NI
4A	\$ - G	0-6"	1/21/94	128.4	N
4C	S - G	12-18"	1/21/94	1.50	NE
5A	S - G	0-6"	1/21/94	66.7	NE
5C	\$ - G	12-18"	1/21/94	ND	NE
6A	S - G	0-6"	1/21/94	0.44	NE
6C	S - G	12-18"	1/21/94	ND	NE
	Overlar	SWMU13 nd Flow Treat	ment Area		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1A	S - G	0-6"	1/14/94	2.81	NC
1C	S - G	12-18"	1/14/94	2.3	NE
2A	S - G	0-6"	1/14/94	8.77	NC
2C	S - G	12-18"	1/14/94	49.13	NC
3A	S - G	0-6"	1/14/94	83.9	NE
3C	S - G	12-18"	1/14/94	6923.6	0.124
4A	\$ - G	0-6"	1/14/94	124.4	NE
4C	S - G	12-18"	1/14/94	324.4	NC
5A	S - G	0-6	1/14/94	15.77	NE
5C	S - G	12-18"	1/14/94	73.93	NE
6A	S-G	0-6"	1/14/94	47.9	NE
6C	S - G	12-18"	1/14/94	0.60	NC
7A	S - G - Dup (SWMU13-1A)	0-6"	1/14/94	6.67	NE
		SWMU17			
		d Wood Store		7-4-1 5-44-1-1	Taat Maladia
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1A	S · G	0-6"	1/20/94	82.8	ND 0.17
1C	\$ - G	12-18"	1/20/94	100.2	0.17
2A	S - G	0-6"	1/20/94	53.5	ND ND
2C	\$ - G	12-18"	1/20/94	15.26	NE
3A	S - G	0-6"	1/20/94	17.34	NE NE
3C	\$ - G	12-18"	1/20/94	21.97	NE
4A	<u> </u>	0-6"	1/20/94	3.27	NE
4C	\$ - G	12-18"	1/20/94	22.31	NE
5A	\$ - G	0-6"	1/20/94	215	NC
5C	S - G	12-18"	1/20/94	2.05	NE

S: Soil G: Grab C: Composite

Dup: Duplicate

CONFIRMATORY SAMPLING RESULTS SOUTHERN WOOD PIEDMONT CHATTANOOGA, TN

		SWMU19			
		Natural Pond 1	В		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
C1A	Sediment - C	0-6"	1/14/94	255.1	0.006
2	Water	SWP #11681	1/13/94	l ND	Ni
	Sui!	SWMU21 tch Tie Storage	. Aras		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg
1A	S-G	0-6"	1/14/94	2.8	0.007
1D	S - G	24-36"	1/14/94	ND	N
2A	S - G	0-6"	1/14/94	ND	N
2C	S - G	12-18"	1/14/94	ND	N
3A	S - G	0-6"	1/14/94	32.5	N
3C	S - G	12-18*	1/14/94	9.01	0.06
4A	S - G	0-6*	1/14/94	119.03	NI
4C	S - G	12-18"	1/14/94	1.77	0.027
4D	S - G	30-36"	1/14/94	ND	N
5A	S - G	0-6"	1/14/94	114.8	NI
		SWMU24			
	r .	Dump Area	I a	I	
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1A	S - G	0-6*	1/20/94	191.0	N
1C	S - G	12-18*	1/20/94	130.0	NI
2A	S - G	0-6"	1/20/94	21.31	NI
3A	S - G	0-6"	1/20/94	57.0	NI NI
3C	S - G	12-18"	1/20/94	79.4	N
4A	S - G	0-6"	1/20/94	1204	N
5A	S - G - Dup (SWMU24-1C)	0-6*	1/20/94	230.9	NI NI
		SWMU25 Ditch / Culver			
CI-	I			Total Extractable	Total Volatile
Sample	Sample	Sample	Sample	i I	
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
2D	S - G	36-48*	1/13/94	6.85	NO
3D	S-G	36-42"	1/13/94	ND ND	NI NI
4D	S - G - Dup (SWMU25-3D)	36-42* SWMU29	1/13/94	ND.	INI
	Woo	d Treating Ves	sel Pit		
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)
1D	\$ - G	6-7.5'	1/25/94	591	1.6
1E	S - G	14.5-16'	1/25/94	664	0.7
2D	S-G	9-10'	1/25/94	623	14.0

CONFIRMATORY SAMPLING RESULTS SOUTHERN WOOD PIEDMONT CHATTANOOGA, TN

	SWMU29 Wood Treating Vessel Pit											
Sample	Sample	Sample	Sample	Total Extractable	Total Volatile							
Location	Туре	Depth	Date	Organics (mg/kg)	Organics (mg/kg)							
3D	S - G	6-7.5'	1/25/94	3400	31.2							
3E	S - G	9-10.5'	1/25/94	1722	4.25							
5D	S - G	6-7.5'	1/25/94	2480	69.7							
5E	S - G	9-10.5'	1/25/94	2300	8.29							

S: Soil

C: Composite

D--- 5 - 6 5

TABLE 3-6 BASELINE SAMPLING RESULTS SAMPLE DATE AUGUST 9-10, 1999 SWP – CHATTANOOGA, TN SITE

																			-										
Parameter	Detection Limit, mg/L	C-1 (*)	C-2 (b)	C-3	C-4	C-5	C-6	C-9	C-10	C-11	C-13	C-15	C-16	C-17	C-18	C-21	C-29	C-30	C-33	C-34	C-35	C-36	L-1B	L-2B	L-3B	U-1B	U-2B	U-4B	U-3B
Naphthalene	0.010	ND	ND	ND	ND	ND	0.77	ND	ND	0.28	ND	0.024	0.029	ND	ND	ND	МĐ	ND	5	ND	ND	ND	ND	ND	2.6	ND	ND	0.34	ND
Acenaphthene	0.010	ND	ND	ND	ND	ND	0.29	ND	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	0.69	ND	ND	ND	. ND
Phenanthrene	0.010	ND	ND	ND	ND	ND	0.18	ND	ND	0.032	ND	0.012	ND	ND	ND	ND	ND	ND	1.1	ND	ND	ND	ND	ND	0.41	ND	ND	0.039	ND
Fluoranthene	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	МĎ	ND	ND	ND	ND	0.39	ND	ND	ND	ND	ND	ND	ND	ND	0.029	ND
Carbazole	0.010	ND	ND	ND	ND	NĐ	0.047	ND	ND	0.014	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	0.35	ND	ND	ND	ND
Fluorene	0.010	ND	ND	ND	ND	ND	0.18	ND	ND	0.051	ND	0.046	ND	ND	ND	ND	ND	ND	0.76	ND	ND	ND	ND	ND	0.32	ND	ND	0.013	ND
2-Methylnaphthalene	0.010	ND	ND	ND	ND	ND	0.27	ND	ND	0.18	ND	ND	ND	ND	ND	ND	ND	ND	0.77	ND	ND	ND	ND	ND	1.2	ND	ND	0.019	ND
Dibenzofuran	0.010	ND	ND	ND	ND	ND	0.16	NĐ	ND	ND	ND	0.047	ND.	ND	ND	ND	ND	ND	0.94	ND	ND	ND	ND	ND	0.4	ND	ND	0.018	ND
Pyrene	0.010	ND	ND	ND	ND	ND	ND	ND	.ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	'nD	ND	ND	ND	ND	ND	ND	ND	0.017	ND
Toluene	0.010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NĐ	0.026	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.0010	ND	ND	ND	ND	ND	ND	ND	ND	0.0024	ND	0.0024	ND	ND	ND	ND	ND	ND	0.042	ND	ND	ND	NĐ	ND	ND	ND	ND	ND	ND
1,2-Dimethylbenzene	0.0010	ND	ND	ND	ND	ND	0.0030	ND	ND	0.0040	ND	ND	ND	ND	ND	ND	ND	ND	0.059	ND	ND	ND	ND	ND	0.0036	ND	ND	ND	ND
1,3-Dimethylbenzene	0.0010	ND	ND	ND	ND	ND	0.0031	ND	ND	0.0033	ND	ND ,	ND	ND	ND	ND	ND	ND	0.082	ND	ND	ND	ND	ND	0.0042	ŃD	ND	ND	ND
1,4-Dimethylbenzene	0.0010	ND	ND	ND	ND	ND	0.0018	ND	ND	0.0026	ND	ND	МĐ	ND	ND	ND	ND	ND	0.035	ND	ND	ND	ND	ND	0.0016	ND	ND	ND	ND
Ethylbenzene	0.0010	ND	ND	ND	ND	ΝĐ	0.0038	ND	ND	0.0019	ND	ND	ND	ND	ND	ND	ND	ND	0.037	ND	ND	ND -	ND	ND	0.0027	ND	ND	ND	ND
Styrene	0.0010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	МĐ	ND	ND	ND	ND	ND	0.0058	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total EOCs	N/A	ND	ND	ND	ND	ND	1.897	ND	ND	0.687	ND	0,129	0.029	ND	ND	ND	ND	ND	10.69	ND	ND	ND	ND	ND	5.97	ND	ND	0.475	ND
Total VOCs	N/A	ND	ND	ND	ND	ND	0.0117	ND	ND	0.0142	ND	0.0024	ND_	ND	ND	ND	ND	ND	0.2868	ND	ND	ND	ND	ND	0.0121	ND	ND	ND	ND

Prepared By: SBH 8/30/99 Checked By: MJA 8/31/99

⁽a) Confirmation sampling results obtained September 23, 1999.

(b) Confirmation sampling (9/23/99) has the same results as the initial sampling event (i.e., all nondetect). EOCs - Extractable Organic Compounds VOCs - Volatile Organic Compounds ND - Not detected at or above the detection limit N/A - Not applicable

mg/L - Milligrams per liter

TABLE 3-7 SURFACE WATER QUALITY DATA SUMMARY - K001 CONSTITUENTS - 1985 SOUTHERN WOOD PIEDMONT COMPANY - CHATTANOOGA, TENNESSEE FACILITY

SAMPLING STATION NO.		2-CHLORO- PHENOL	PHENOL	2-4-DIMETHYL- PHENOL	2,4,6-TRI CHLOROPHENOL	P-CHLORO-M CREOSOL	TETRACHLORO- PHENOL	2-4-DINITRO PHENOL	<u> </u>	NAPHTHALENE		PHENANTHRENE + ANTHRACENE ANOOGA CREEK (mg/l)	FLUORO- ANTHRENE	CHRYSENE + DIBENZ(A)ANTH- RACENE	BENZO(B)FLUORANTHEN + BENZO(K)FLUORANTHEN	BENZO(A)	INDENO(1,2,3-CD)PYRENE + DIBENZO(A,H)ANTHRACENE	CARBAZOLE
SS-1	04/19/85	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	· ND	ND	ND	ND	ND	ND	ND	ND
SS-2	04/19/85	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SS-3	04/19/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NO	ND	ND	ND	ND	ND
SS-4	04/19/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SURFACE WATER SAMPLES FROM CHATTANOOGA CREEK (ug/l)(ppb)																	
S-1	06/20/85		<3							ND	ND	ND ND	ND	ND	. ND	ND	ND	ND
S-2	06/20/85		<3		***					ND	ND.	ND	ND	ND	ND_	ND	ND	ND
S-3	06/20/85		<3					***		ND	ND	ND	ND	ND	, ND	ŅD	ND	ND
S-4	06/20/85		10_		***					ND	ND	ND	ND	ND	ND	ND	ND	ND
S-6	06/20/85		<3						***	ND	ND	ND	ND	ND	ND	ND	ND	_ND
S-7	06/20/85		<3						***	ND	ND	ND	ND	ND	ND ND	ND	ND	ND
S-8	06/20/85		<3							<10	ND	ND	ND	ND	ND	ND	_ ND	ND
S-9	06/20/85		14,700				***			16,000	1,600	2,600	1,700	450	160	90	ND	630
S-10	06/20/85		্					***		ND	<10	ND	<10	ND	ND	ND	ND	ND

ND = NOT DETECTED

>5: DETECTED BUT AT A LEVEL LESS THAN 5 PPB (PARTS PER BILLION)
>10: DETECTED BUT AT A LEVEL LESS THAN 10 PPB (PARTS PER BILLION)

* ANALYSIS BY SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

** ANALYSIS BY IT ANALYTICAL SERVICES

TV 5/30/01 MAB 5/30/01 Prepared By/Date: _ Checked By/Date: _

TABLE 3-8

Analytical Results from Surface Water Samples Collected in Chattanooga Creek, Hamilton County, Tennessee December 5, 1995

Bromomethane		SAMPLE: DATE:	SW-LOC-3 12/5/95	SW-LOC-4 12/5/95	SW-LOC-8 12/5/95	Analytical Detection Limit
Method 8240 (mg/l) Chloromethane ND ND ND ND 0.016	ANALYTE					
Bromomethane						
Bromomethane	Chloromethane		ND	ND	ND	0.010
Vinyl chloride ND ND ND 0.010 Chloroethane ND ND ND 0.010 Methylene chloride (Dichloromethane) ND ND ND ND 0.0050 Acetone ND ND ND ND ND 0.0050 Carbon disulfide ND ND ND ND 0.0050 1,1 - Dichloroethene ND ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND ND 0.0050 1,2 - Dichloroethylene ND ND ND ND 0.0050 cis - 1,2 - Dichloroethylene ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 1,1 - Trichloroethane ND ND ND ND 0.0050 1,1,1 - Trichloroethane ND ND ND ND 0.0050			ND	ND		0.010
Chloroethane ND ND ND 0.010 Methylene chloride (Dichloromethane) ND ND ND 0.0030 Acetone ND ND ND ND 0.0050 Carbon disulfide ND ND ND ND 0.0050 1,1 - Dichloroethene ND ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 1,2 - Dichloroethane ND ND ND ND 0.0050 1,2 - Dichloroethane ND ND ND ND 0.0050 1,1,1 - Trichloroethane ND ND ND ND 0.0050 1,1,1 - Trichloroethane ND ND ND ND 0.0050 <	Vinyl chloride		ND			
Methylene chloride (Dichloromethane) ND ND ND 0.0050 Acetone ND ND ND ND 0.025 Carbon disulfide ND ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND ND ND 0.0050 cis - 1,2 - Dichloroethylene ND ND ND ND ND ND 0.0050 Cis - 1,2 - Dichloroethylene ND ND ND ND ND 0.0050 Chloroform ND ND ND ND ND 0.0050 Chloroformethane ND ND ND ND ND 0.0050 1,1,1 - Trichloroethane ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.0050 <t< td=""><td></td><td></td><td>ND</td><td></td><td></td><td>0.010</td></t<>			ND			0.010
Acetone ND ND ND 0.025 Carbon disulfide ND ND ND ND 0.0050 1,1 - Dichloroethene ND ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND ND 0.0050 cis - 1,2 - Dichloroethene ND ND ND ND 0.0050 Chloroform ND ND ND ND ND 0.0050 Chloroform ND ND ND ND ND 0.0050 L,2 - Dichloroethane ND ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND 0.0050 1,1,1 - Trichloroethane ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND	Methylene chloride (Dichloromethane)		ND	ND		0.0050
Carbon disulfide ND ND ND 0.0050 1,1 - Dichloroethene ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND ND 0.0050 cis - 1,2 - Dichloroethene ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 L2 - Dichloroethane ND ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND ND 0.025 1,1,1 - Trichloroethane ND ND ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND			ND	ND		0.025
1,1 - Dichloroethene ND ND ND 0.0050 1,1 - Dichloroethane ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND ND 0.0050 cis - 1,2 - Dichloroethene ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 L,2 - Dichloroethane ND ND ND ND 0.0050 L,2 - Dichloroethane ND ND ND ND 0.0050 1,2 - Dichloroethane ND ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND 0.0050 0.025 1,1 - Trichloroethane ND ND ND ND 0.0050 0.0050 1,1,2 - Tetrachloroethane ND ND ND ND 0.0050 0.0050 0.0050 0.0050 0.0	Carbon disulfide					
1,1 - Dichloroethane ND ND ND 0.0050 trans - 1,2 - Dichloroethylene ND ND ND 0.0050 cis - 1,2 - Dichloroethene ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 Chloroform ND ND ND ND 0.0050 1,2 - Dichloroethane ND ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND ND 0.025 1,1,1 - Trichloroethane ND ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.010 Bromodichloromethane ND ND ND ND 0.0050 1,2 - 2 Trichloropropene ND ND ND ND 0.0050 </td <td>1.1 - Dichloroethene</td> <td></td> <td></td> <td></td> <td></td> <td></td>	1.1 - Dichloroethene					
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Chloroform ND ND ND 0.0050 1,2 - Dichloroethane ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND 0.025 1,1,1 - Trichloroethane ND ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.0050 Bromodichloromethane ND ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Trichloroethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050	•					0.0050
1,2 - Dichloroethane ND ND ND 0.0050 2 - Butanone (MEK) ND ND ND ND 0.025 1,1,1 - Trichloroethane ND ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.010 Bromodichloromethane ND ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 Trichloroethane ND ND ND ND 0.0050 Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 </td <td></td> <td>•</td> <td>ND</td> <td></td> <td></td> <td>0.0050</td>		•	ND			0.0050
2 - Butanone (MEK) ND ND ND 0.025 1,1,1 - Trichloroethane ND ND ND 0.0050 Carbon tetrachloride ND ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.010 Bromodichloromethane ND ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 Trichloroethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050	1,2 - Dichloroethane		ND	ND		0.0050
1,1,1 - Trichloroethane ND ND ND 0.0050 Carbon tetrachloride ND ND ND 0.0050 Vinyl acetate ND ND ND ND 0.010 Bromodichloromethane ND ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 trans - 1,3-Dichloropropene ND ND ND ND ND 0.0050 Trichloroethene ND ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND <td></td> <td></td> <td>ND</td> <td>ND</td> <td>ND</td> <td>0.025</td>			ND	ND	ND	0.025
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Vinyl acetate ND ND ND 0.010 Bromodichloromethane ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 trans - 1,3-Dichloropropene ND ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND 0.0050 Bromoform ND ND ND 0.0050 2 - Hexanone ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND			ND	ND		0.0050
Bromodichloromethane ND ND ND 0.0050 1,1,2,2 - Tetrachloroethane ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND ND 0.0050 trans - 1,3-Dichloropropene ND ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.0050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND ND	Vinyl acetate	-	ND	ND		0.010
1,1,2,2 - Tetrachloroethane ND ND ND 0.0050 1,2 - Dichloropropane ND ND ND 0.0050 trans - 1,3-Dichloropropene ND ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.0050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Toluene ND ND ND ND ND	-		ND			0.0050
1,2 - Dichloropropane ND ND ND 0.0050 trans - 1,3-Dichloropropene ND ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND ND 0.0050 Benzene ND ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND ND 0.0050 Bromoform ND ND ND ND 0.0050 0.0050 2 - Hexanone ND ND ND ND 0.025 0.0050 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050	1,1,2,2 - Tetrachloroethane					0.0050
trans - 1,3-Dichloropropene ND ND ND 0.0050 Trichloroethene ND ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND ND 0.0050 Benzene ND ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND ND 0.0050 Bromoform ND ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Totuene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Styrene ND			ND '			0.0050
Trichloroethene ND ND ND 0.0050 Dibromochloromethane ND ND ND ND 0.0050 1,1,2 - Trichloroethane ND ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND ND 0.0050 Bromoform ND ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Styrene ND ND ND 0.0050 0.0050			ND			0.0050
1,1,2 - Trichloroethane ND ND ND 0.0050 Benzene ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Totuene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	Trichloroethene		ND	ND		0.0050
1,1,2 - Trichloroethane ND ND ND 0.0050 Benzene ND ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	Dibromochloromethane		ND	ND		0.0050
Benzene ND ND ND 0.0050 cis - 1,3 - Dichloropropene ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND ND 0.0050 Totuene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	1,1,2 - Trichloroethane		ND	ND		0.0050
cis - 1,3 - Dichloropropene ND ND ND 0.0050 2 - Chloroethylvinyl ether ND ND ND ND 0.050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.0050 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050			ND	ND		0.0050
2 - Chloroethylvinyl ether ND ND ND 0.050 Bromoform ND ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.025 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	cis - 1,3 - Dichloropropene		ND	ND		0.0050
Bromoform ND ND ND 0.0050 2 - Hexanone ND ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND ND 0.025 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	• •		ND			
2 - Hexanone ND ND ND 0.025 4 - Methyl - 2 - pentanone (MIBK) ND ND ND ND 0.025 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050						
4 - Methyl - 2 - pentanone (MIBK) ND ND ND 0.025 Tetrachloroethene ND ND ND ND 0.0050 Toluene ND ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050						
Tetrachloroethene ND ND ND 0.0050 Toluene ND ND ND 0.0050 Chlorobenzene ND ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050						
Toluene ND ND ND 0.0050 Chlorobenzene ND ND ND 0.0050 Ethylbenzene ND ND ND ND 0.0050 Styrene ND ND ND ND 0.0050	• • •					0.0050
Chłorobenzene ND ND ND 0.0050 Ethylbenzene ND ND ND 0.0050 Styrene ND ND ND ND 0.0050						
Ethylbenzene ND ND ND 0.0050 Styrene ND ND ND 0.0050						
Styrene ND ND ND 0.0050						
•	-					
OUD IND IND UNDO	Xylenes		ND	ND	ND	0.0050

TABLE 3-8

Analytical Results from Surface Water Samples Collected in Chattanooga Creek, Hamilton County, Tennessee December 5, 1995

	SAMPLE: DATE:	SW-LOC-3 12/5/95	SW-LOC-4 12/5/95	SW-LOC-8 12/5/95	Analytical Detection
Semi-volatile Organic Compounds (Me	thod 8270)	(mg/l)			Limit
Semi-volatile Organic Compounds (MC	,				
1,3 - Dichlorobenzene		ND	ND	ND	0.010
1,4 - Dichlorobenzene		ND	ND	ND	0.010
Hexachloroethane		ND	ND	ND	0.010
bis (2 - Chloroethyl) ether		ND	ND	ND	0.010
1,2 - Dichlorobenzene		ND	ND	ND	0.010
bis (2 - Chloroisopropyl) ether		ND	ND	ND	0.010
n - Nitrosodi - n - propylamine		ND	ND	ND	0.010
Nitrobenzene		ND	ND	ND	0.010
Hexachlorobutadiene		ND	ND	ND	0.010
1,2, 4 - Trichlorobenzene		ND	ND	ND	0.010
Isophorone		ND	ND	ND	0.010
Napthalene		ND	ND	ND	0.010
bis (2 - Chloroethoxy)methane		ND	ND	ND	0.010
Hexachlorocyclopentadiene		ND	ND	ND	0.010
2 - Chloronapthalene		ND	ND	ND	0.010
Acenaphthylene		ND	ND	ND	0.010
Acenapthene		ND	ND	ND	0.010
Dimethylphthalate		ND	ND	ND	0.010
2,6 - Dinitrotoluene		ND	ND	ND	0.010
Fluorene		ND	ND	ND	0.010
4 - Chlorophenylphenyl ether		ND	ND	ND	0.010
2,4 - Dinitrotoluene		ND	ND	ND	0.010
Diethylphthalate		ND	ND	ND	0.010
N - Nitrosodiphenylamine/Diphenylamin	e	ND	ND	ND	0.010
Hexachlorobenzene		ND	ND	ND	0.010
4 - Bromophenyl phenyl ether		ND	ND	ND	0.010
Phenanthrene		ND	ND	ND	0.010
Anthracene		ND	ND	ND	0.010
Di - n - butylphthalate		ND	ND	ND	0.010
Fluoranthene		ND	ND	ND	0.010
Pyrene		ND	ND	ND	0.010
Benzidine		ND	ND	ND	0.080
Butylbenzylphthalate		ND	ND	ND	0.010
bis (2 - Ethylhexyl) phthalate		ND	ND	ND	0.010
Chrysene		ND	ND	ND	0.010
Benzo (a) anthracene		ND	ND	ND	0.010
3,3' -Dichlorobenzidine		ND	ND	ND	0.010
Di-n-octylphthalate		ND	ND	ND	0.010
Benzo (b) fluoranthene		ND	ND	ND	0.010
Benzo (k) fluoranthene		ND	ND	ND	0.010
Benzo (a) pyrene		ND	ND	ND	0.010
Indeno (1,2,3 - cd) pyrene		ND	ND	ND	0.010

TABLE 3-8

Analytical Results from Surface Water Samples Collected in Chattanooga Creek, Hamilton County, Tennessee December 5, 1995

SAMPL DAT		SW-LOC-4 12/5/95	SW-LOC-8 12/5/95	Analytical Detection Limit
Dibenzo (a,h) anthracene	ND	ND	ND	0.010
Benzo (g,h,i) perylene	ND	ND	ND	0.010
N-Nitrosodimethylamine	ND	ND	ND	0.010
2-Chlorophenol	ND-	ND	ND	0.010
2-Nitrophenol	ND	ND	ND	0.050
Phenol	ND	ND	ND	0.010
2,4-Dimethylphenol	ND	ND	ND	0.010
2,4-Dichlorophenol	ND	ND	ND	0.010
2,4,6-Trichlorophenol	ND	ND	ND	0.010
4-Chloro-3-methylphenol	ND	ND	ND	0.010
2,4-Dinitrophenol	ND	ND	ND	0.010
2-Methyl-4, 6-dinitrophenol	ND	ND	ND	0.010
Pentachlorophenol	ND	ND	ND	0.050
4 - Nitrophenol	ND	ND	ND	0.050
Benzyl alcohol	ND	ND	ND	0.010
2 - Methylphenol (o-cresol)	ND	ND	ND	0.010
3 - Methylphenol/4-Methylphenol (m&p-cresol)	ND	ND	ND	0.010
Benzoic acid	ND	ND	ND	0.050
4 - Chloroaniline	ND	ND	ND	0.020
2-Methylnapthalene	ND	ND	ND	0.010
2,4,5-Trichlorophenol	ND	ND	ND	0.010
2-Nitroaniline	ND	ND	ND	0.050
3-Nitroaniline	ND	ND	ND	0.050
Dibenzofuran	ND	ND	ND	0.010
4-Nitroaniline	ND	ND	ND	0.050
Pesticides/PCBs (Method 8080) (mg/l)				
Aldrin	ND	ND	ND	0.000050
alpha-BHC	ND	ND	ND	0.000050
beta-BHC	ND	ND	ND	0.000050
gamma-BHC	ND	ND	ND	0.000050
delta-BHC	ND	ND	ND	0.000050
Chlordane	ND	ND	ND	0.00050
4,4'-DDD	ND	ND	ND	0.00010
4,4'-DDE	ND	ND	ND	0.00010
4,4'-DDT	ND	ND	ND	0.00010
Dieldrin	ND	ND	ND	0.00010
Endosulfan I	ND	ND	ND	0.000050
Endosulfan II	ND	ND	ND	0.00010
Endosulfan sulfate	ND	ND	ND	0.00010
Endrin	ND	ND	ND	0.00010
Endrin aldehyde	ND	ND	ND	0.00010

TABLE 3-8

Analytical Results from Surface Water Samples Collected in Chattanooga Creek, Hamilton County, Tennessee December 5, 1995

	SAMPLE: DATE:	SW-LOC-3 12/5/95	SW-LOC-4 12/5/95	SW-LOC-8 12/5/95	Analytical Detection Limit
Heptachlor	· · · · · · · · · · · · · · · · · · ·	ND	ND	ND	0.000050
Heptachlor epoxide		ND	ND	ND	0.000050
Methoxychlor		ND	ND	ND	0.00050
Toxaphene		ND	ND	ND	0.0050
Aroclor-1016		ND	ND	ND	0.0010
Aroclor-1221		ND	ND	ND	0.0020
Aroclor-1232		ND	ND	ND	0.0010
Aroclor-1242		ND	ND	ND	0.0010
Aroclor-1248		ND	ND	ND	0.0010
Aroclor-1254		ND	ND	ND	0.0010
Aroclor-1260		ND	ND	ND	0.0010
Metals (Method 6010) (mg/l)					
Copper		ND	ND	ND	0.025
Nickel		ND	ND	ND	0.040
Cadmium		ND	ND	ND	0.0050
Chromium		ND	ND	ND	0.010
Lead		ND	ND	ND	0.0050
Selenium		ND	ND	ND	0.010
Zinc		ND	ND	ND	0.020
Mercury (Method 7470/7471) (mg/)		ND	ND	ND	0.00020
Cyanide (Method 9010) (mg/l)		ND	ND	ND	0.010

Notes:

mg/l indicates milligrams/liter

ND indicates not detected at the analytical detection limit

Prepared/Date:DMM 4/23/96 Checked/Date:RKC 4/30/96

TARLE 5-1

SUMMARY OF EXPOSURE POTENTIAL FOR CONTAMINATED SOIL AND ASSOCIATED CORRECTIVE ACTION

Location (SWMU/AOC)	Contaminated Media (Source) ⁽¹⁾	Transport Mechanism ^{(2) (3)}	Exposure Pathways	Potential Receptors	Corrective Action (CA)	Status of CA
SWMU 1-Pond 1A (retains storm water)	-submerged soil	-Direct Contact during filling	-self-ingestion/adsorption	-Construction worker (during draining & filling)	-PPE for construction worker -Filling pond with clean soil -Restricted access	- Future - Future - Present
SWMU 2-Pond 1B (retains storm water)	-submerged soil	-Direct Contact during filling	-self-ingestion/adsorption	-Construction worker (during draining & filling)	-PPE for construction worker -Filling pond with clean soil -Restricted access	- Future - Future - Present
SWMU 3-Pond 2A (retains storm water)	-submerged soil	-Direct Contact during filling - See note 4	-self-ingestion/adsorption	-Construction worker (during draining & filling)	-PPE for construction worker -Filling pond with clean soil -Restricted access	- Future - Future - Present
SWMU 4-Pond 2B (retains storm water)	-submerged soil	-Direct Contact during filling - See note 4	-self-ingestion/adsorption	-Construction worker (during draining & filling)	-PPE for construction worker -Filling pond with clean soil -Restricted access	- Future - Future - Present
SWMU 6-Pond 3B (retains storm water)	-submerged soil	-Direct Contact during filling	-self-ingestion/adsorption	-Construction worker (during draining & filling)	-PPE for construction worker -Filling pond with clean soil -Restricted access	- Future - Future - Present
SWMU 8-Drip track	-subsurface soil (>36 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present
SWMU 12-Treated wood storage area	-subsurface soil (below gravel surface)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present
SWMU 13-Overland flow treatment area (wooded wetland)	-surface soil (0 to 6 in.)	-Direct Contact	-self-ingestion/adsorption	-Construction worker -Site superintendent -Well sampling personnel	-PPE for construction worker -PPE for site superintendent & sub- contractor during well inspection, maintenance & sampling -Restricted access	- Present - Present - Present
	-subsurface soil (12 to 18 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker	- Present

TABLE 5-1

SUMMARY OF EXPOSURE POTENTIAL FOR CONTAMINATED SOIL AND ASSOCIATED CORRECTIVE ACTION

Location (SWMU/AOC)	Contaminated Media (Source) ⁽¹⁾	Transport Mechanism ^{(2) (3)}	Exposure Pathways	Potential Receptors	Corrective Action (CA)	Status of CA
SWMU 17-Treated wood storage area	-surface soil (0 to 6 in.)	-Direct Contact -Wind erosion & atmospheric dispersion	-self-ingestion/adsorption -dust inhalation	-Construction worker -Site superintendent -Well sampling personnel	-PPE for construction worker -Dust control during site disturbance -Dust mask during mowing (Site Superintendent) -Maintain site vegetative cover -PPE for site superintendent & sub- contractor during well inspection,	- Present - Present - Present - Present - Present
					maintenance & sampling -Restricted access	- Present
	-subsurface soil (12 to 18 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker	- Present
SWMU 19-Natural pond	-submerged (i.e., underwater) soil	-Direct Contact	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present
SWMU 21-Switch tie storage area	-surface soil (0 to 6 in.)	-Direct Contact -Wind erosion & atmospheric dispersion -See note 4	-self-ingestion/adsorption -dust inhalation	-Construction worker -Site superintendent -Well sampling personnel	-PPE for construction worker -Dust control during site disturbance -Dust mask during mowing (Site Superintendent) -Maintain site vegetative cover -PPE for site superintendent & sub- contractor during well inspection, maintenance & sampling -Restricted access	- Present - Present - Present - Present - Present - Present
SWMU 24-Dump area (covered with debris)	-subsurface soil (under debris)	- Direct Contact (during intrusive work) - See not 5	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present
SWMU 25-Ditch/ Culvert	-subsurface soil (>36 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present
SWMU 29-Former wood treatment vessel area	-subsurface soil (>6 ft.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (intrusive work only)	-PPE for construction worker -Restricted access	- Present - Present

SUMMARY OF EXPOSURE POTENTIAL FOR CONTAMINATED SOIL AND ASSOCIATED CORRECTIVE ACTION

Location (SWMU/AOC)	Contaminated Media (Source) ⁽¹⁾	/51./31	Exposure Pathways	Potential Receptors	Corrective Action (CA)	Status of CA
MWHA No 1	-surface soil (0 to 6 in.)	-Direct Contact -Wind erosion & atmospheric dispersion	-self-ingestion/adsorption -dust inhalation	-Construction worker -Site superintendent -Weli sampling personnel	-PPE for construction worker -Dust control during site disturbance -Dust mask during mowing (Site Superintendent) -Maintain site vegetative cover -PPE for site superintendent & sub- contractor during well inspection, maintenance & sampling -Restricted access	- Present - Present - Present - Present - Present
	-subsurface soil (12 to 18 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (during intrusive work)	-PPE for construction worker	- Present
MWHA No. 2 and Creosote Spill Area	-surface soil (0 to 6 in.)	-Direct Contact -Wind erosion & atmospheric dispersion	-self-ingestion/adsorption -dust inhalation	-Construction worker -Site superintendent	-PPE for construction worker -Dust control during site disturbance -Dust mask during mowing (Site Superintendent) -Maintain site vegetative cover -Restricted access	- Present - Present - Present - Present - Present
	-subsurface soil (12 to 18 in.)	- Direct Contact (during intrusive work)	-self-ingestion/adsorption	-Construction worker (during intrusive work)	-PPE for construction worker	- Present

Notes: Corrective actions are being implemented for DNAPL sources and therefore, deep soil containing DNAPL is not included in this exposure/risk summary.

- Stormwater/surface water transport mechanism is not included in this summary because monitoring in place under stormwater NPDES program has shown that this transport mechanism is not present in measurable amounts.
- Leaching and ground-water transport mechanism is not included because presently operating ground-water intercept trench prevents transport to Chattanooga Creek.
- 4. No evidence that leaching and ground-water transport to Chattnooga Creek is occurring with clean downgradient well (C-36).
- 5. No evidence that leaching and ground-water transport to Chattnooga Creek is impacting surface water quality with clean creek water sample (S-8) just

Table 7-1 Site-Specific Constituents and Proposed Ground-Water Protection Standards Southern Wood Piedmont, Chattanooga, Tennessee

	Proposed	Proposed	
	GWPS	GWPS	
Committee	Segment One	Segment Two	
Constituent	(mg/L)	(mg/L)	
PHENOLICS:			
2,4-Dimethylphenol	9.88E+01	3,90E±01	
2-Methylphenol	1.18E+02	4.60E+01	
3-Methylphenol	1.18E+02	4.60E-01	
4-Methylphenol	1.30E+01	5.12E+00	
Phenol	3.65E+03	1.44E+03	
SINGLE-RING AROMATICS:			
1,2-Dimethylbenzene	1.78E+02	1.78E+02	
1,3-Dintethylbenzene	1.62E+02	1.62E+02	
1.4-Dimethylbenzene	1.98E+02	1.98E+02	
Benzene	1.07E+01	4.21E+00	
Ethylbenzene	1.52E+02	1.52E+02	
Styrene	2.13E+02	8.42E+01	
Toluene	5,15E+02	5,15E+02	
LIGHT AROMATICS:			
2-Methylnaphthalene	1.32E+03	5.22E+02	
Acenaphthene	3.90E+00	3.90E+00	
Acenaphthylene	3.93E+00	3,93E+00	
Anthracene	1.29 E +00	1,29E+00	
Carbazole	5.50E+00	2.17E+00	
Dibenzofuran	4.22E+00	4.22E+00	
Fluoranthene	1.20E-01	1.20E-01	
Fluorene	1.90E-00	1.90E+00	
Naphthalene	3.17E+01	3.17E+01	
Phenanthrene	8.16E-01	8.16E-01	
HEAVY AROMATICS:			
Benzo(a)anthracene	1.00E-02	1.00E-02	
Benzo(a)pyrene	4.27E-01	1.68E-01	
Benzo(b)fluroanthene	1.00E-02	1,00E-02	
Benzo(k)fluoranthene	1.00E-02	1.00E-02	
Chrysene	1.00E-02	1.00E-02	
Dibenzo(a,h)anthracene	1.00E-02	1.00E-02	
ndeno(1,2,3-cd)pyrene	1.00E-02	1.00E-02	
Pyrene	3.20E-02	3.20E-02	
INORGANICS:			
Arsenic	1.07E+02	4.21E+01	
Chromium, Total	1.71E+01	6.74E+00	
Sulfide	4.27E-00	1.68E÷00	

PREPARED/DATE:	MAB 5/13/01
CHECKED/DATE:	SEG 5/14/01

Table 4-1 Summary of Proposed Ground-Water Protection Standards Southern Wood Piedmont, Chattanooga, Tennessee

	Proposed GWPS	Proposed GWPS	
Constituent	Segment One (mg/L)	Segment Two (mg/L)	
PHENOLICS:			
2,4-Dimethylphenol	9.88E+01	3.90E+01	
2-Methylphenol	1.18E+02	4.60E+01	
3-Methylphenol	1.18E+02	4.60E+01	
4-Methylphenol	1.30E+01	5.12E+00	
Phenol	3.65E+03	1.44E+03	
SINGLE-RING AROMATICS:			
1,2-Dimethylbenzene	1.78E+02	1.78E+02	
1,3-Dimethylbenzene	1.62E+02	1.62E+02	
1,4-Dimethylbenzene	1.98E+02	1.98E+02	
Benzene	1.07E+01	4,21E+00	
Ethylbenzene	1.52E+02	1.52E+02	
Styrene	2.13E+02	8.42E+01	
Toluene	5.15E+02	5.15E+02	
LIGHT AROMATICS:			
2-Methylnaphthalene	1.32E+03	5.22E+02	
Acenaphthene	3.90E+00	3.90E+00	
Acenaphthylene	3.93E+00	3.93E+00	
Anthracene	1.29E+00	1.29E+00	
Carbazole	5.50E+00	2.17E+00	
Dibenzofuran	4.22E+00	4.22E+00	
Fluoranthene	1.20E-01	1.20E-01	
Fluorene	1.90E+00	1.90E+00	
Naphthalene	3.17E+01	3.17E+01	
Phenanthrene	8.16E-01	8.16E-01	
HEAVY AROMATICS:			
Benzo(a)anthracene	1.00E-02	1.00E-02	
Benzo(a)pyrene	4.27E-01	1.68E-01	
Benzo(b)fluroanthene	1.00E-02	1.00E-02	
Benzo(k)fluoranthene	1.00E-02	1.00E-02	
Chrysene	1.00E-02	1.00E-02	
Dibenzo(a,h)anthracene	1.00E-02	1.00E-02	
Indeno(1,2,3-cd)pyrene	I.00E-02	1.00E-02	
Pyrene	3.20E-02	3.20E-02	
INORGANICS:			
Arsenic	1.07E+02	4.21E+01	
Chromium, Total	1.71E+01	6.74E+00	
Sulfide	4.27E+00	1.68E+00	

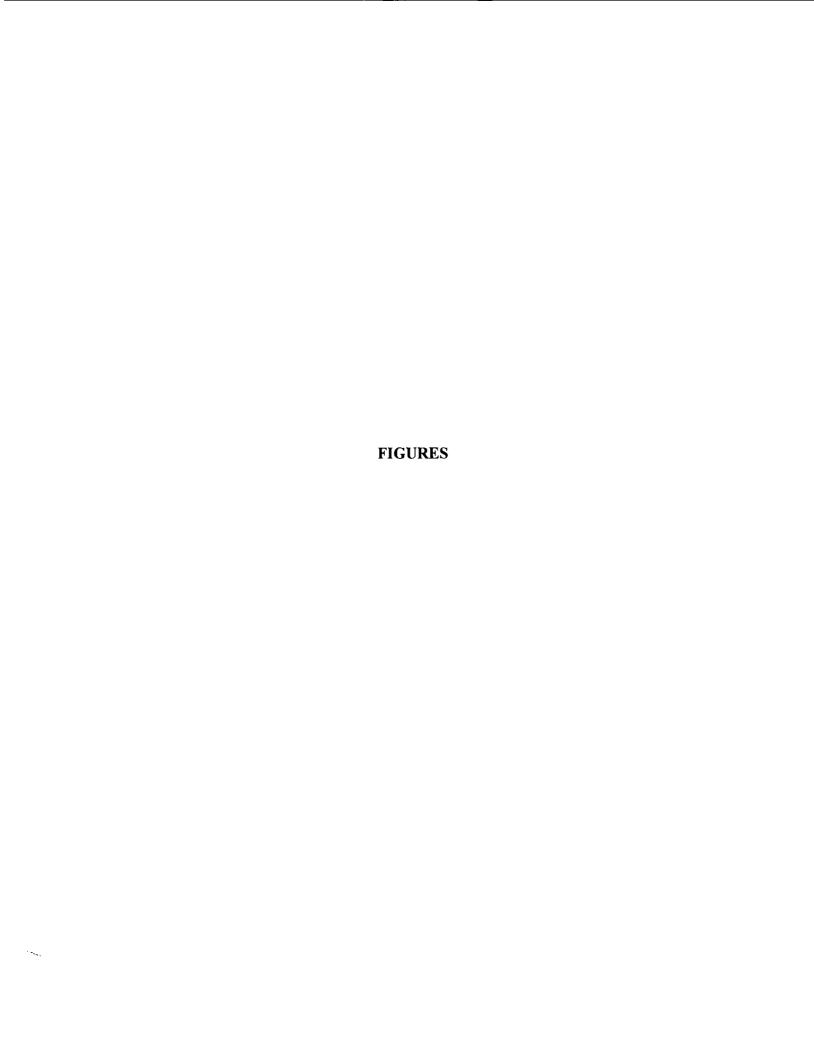
PREPARED/DATE: CHECKED/DATE:

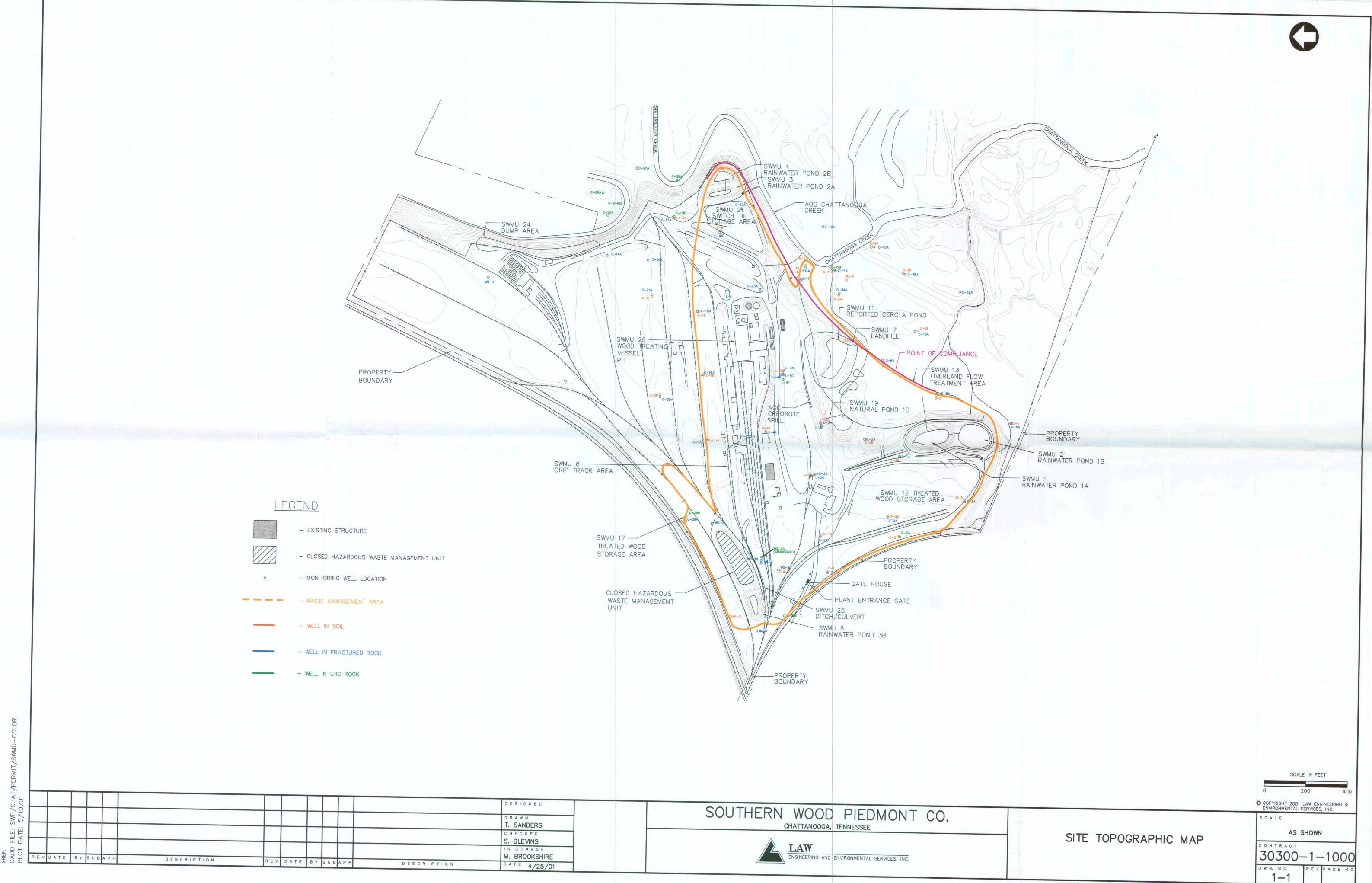
MAB 5/13/01 SEG 5/14/01

TABLE 7-2 POST CLOSURE COST ESTIMATE POST CLOSURE CARE COST ESTIMATE CHATTANOOGA, TENNESSEE

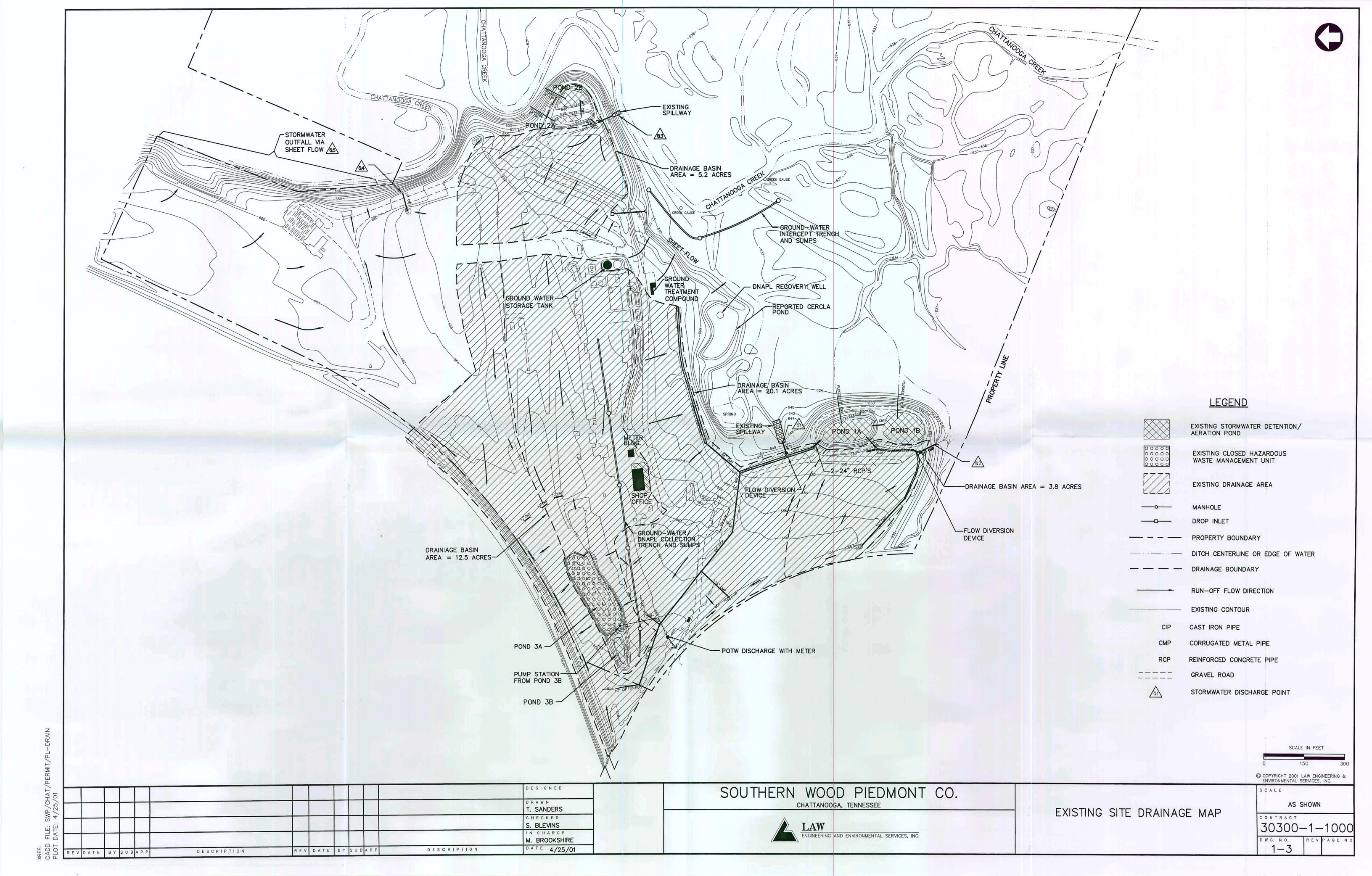
I. GROUNDWATER MONITORING

I. GR	OUNDWATER MONITORING	
A.	Chemical Analysis	
	<pre>1. Point of Compliance Wells (8) (C-5, C-5A, C-6 C-6A,C-7R,C-7AR,C-12A,C-36) \$ 410 (Site Specific) x 8 Samples/event x 2 events/yr x 20 yrs. =</pre>	\$ 131,200
	<pre>2. Internal Monitoring (2) (U-4A,U-4B) \$410 (Site Specific) x 2 samples/event x 20 yrs.=</pre>	\$ 16,400
	TOTAL ANALYTICAL 20 YRS.	\$ 147,600
в.	Sampling	
	$$3,400/\text{event} \times 2 \text{ events/yr} \times 20 \text{ yrs.} =$	\$ 136,000
	TOTAL SAMPLING & ANALYSIS/20 YRS.	\$ 283,600
II.	Vegetative Cover Maintenance	
	A. Plant Grass \$25.90/yr. x 20 yrs. = B. Mow Grass \$77.70/cutting x 4 cutting/yr. x 20 yrs	\$ 518 .=\$ 6,216
	TOTAL VEGETATIVE COVER MAINTENANCE/20 YRS.	\$ 6,734
III.	Inspections	·
	A. Labor 3 hr/mo. x 12 mo/yr x \$5.75/hr. x 20 yrs. =	\$ 4,140
	TOTAL INSPECTIONS/20 YRS.	\$ 4,140
IV.	Corrective Action Monitoring	
	A. Salaries/Benefits/Supplies/Utilities/Other	\$ 118,490
	TOTAL CORRECTIVE ACTION MONITORING/20 YRS.	\$2,369,800
v.	Well Replacement (5 wells x \$5000/well) =	\$ 25,000
٧.	Well Re-development (6 x \$800 x 10 wells) =	\$ 48,000
VI.	Post Closure Certification =	\$ 40,000
	Sub Total 10% Contingency GRAND TOTAL/20 YRS.	\$2,777,274 \$ 277,727.40 \$3,055,001.40









KEY TO MAP 500-Year Flood Boundary-ZONE B 100-Year Flood Boundary ZONE A1 Zone Designations* With Date of Identification ZONE A5 e.g., 12/2/74 DATE 100-Year Flood Boundary ZONE B 500-Year Flood Boundary--513---Base Flood Elevation Line With Elevation In Feet** (EL 987) Base Flood Elevation in Feet Where Uniform Within Zone** RM7× Elevation Reference Mark • M1.5 River Mile **Referenced to the National Geodetic Vertical Datum of 1929 *EXPLANATION OF ZONE DESIGNATIONS EXPLANATION ZONE

Areas of 100-year flood; base flood elevations and Good hazard factors not determined.

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.

Areas of 100-year flood; base flood elevations and flood hazard factors determined.

> Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.

Areas between limits of the 100-year flood and 500year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where * the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)

Areas of minimal flooding, (No shading) C

Areas of undetermined, but possible, flood hazards.

Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.

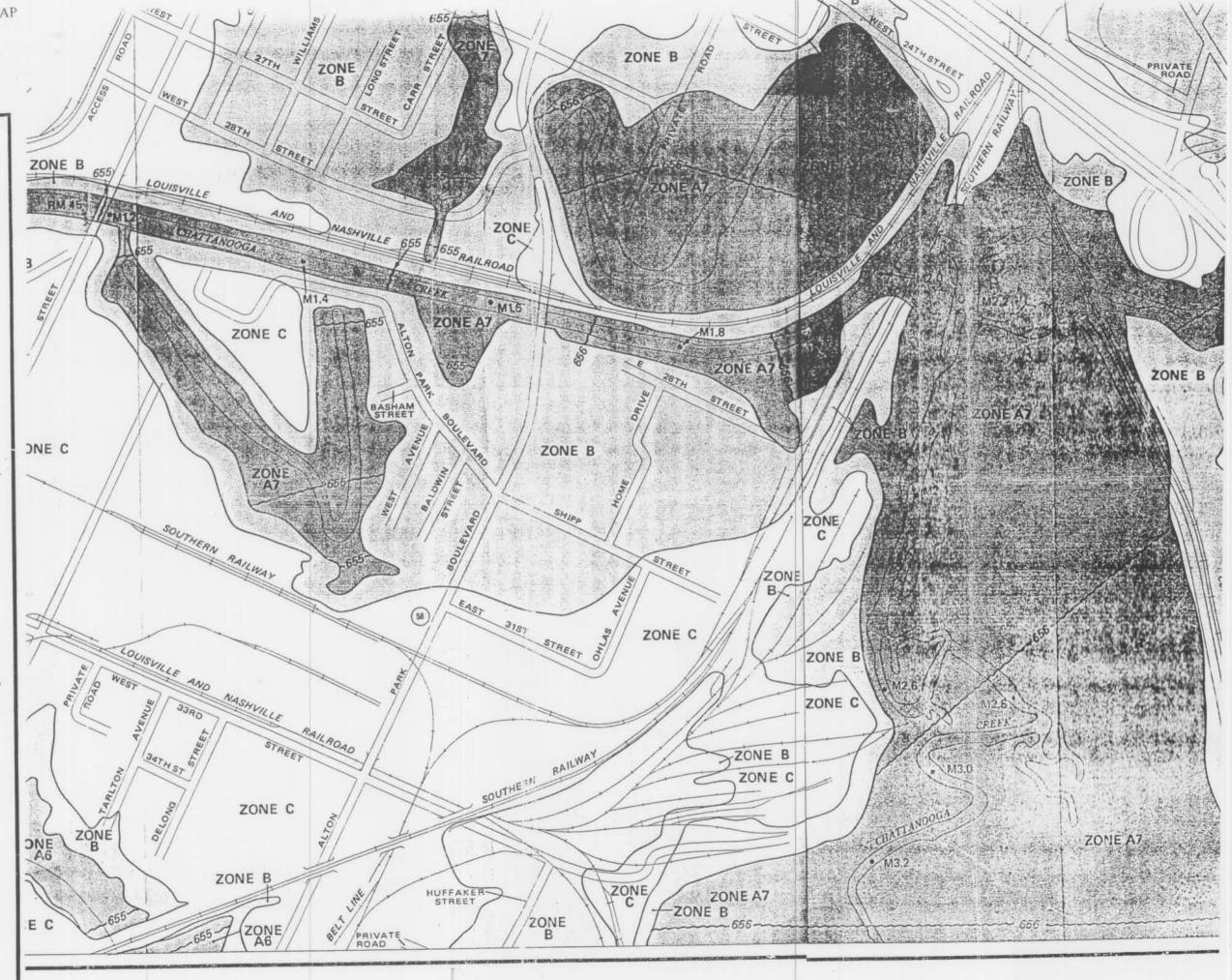
Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

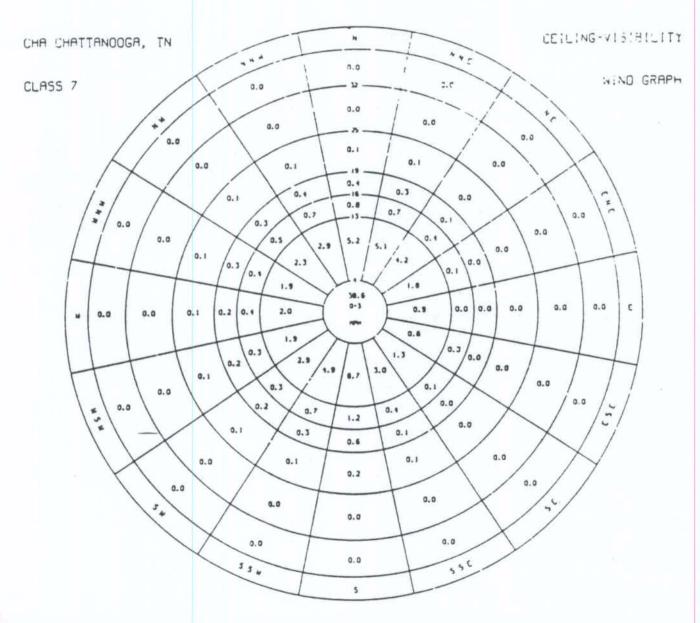
NOTES TO USER

rtain areas not in the special flood hazard areas (zones A and V) ay be protected by flood control structures.

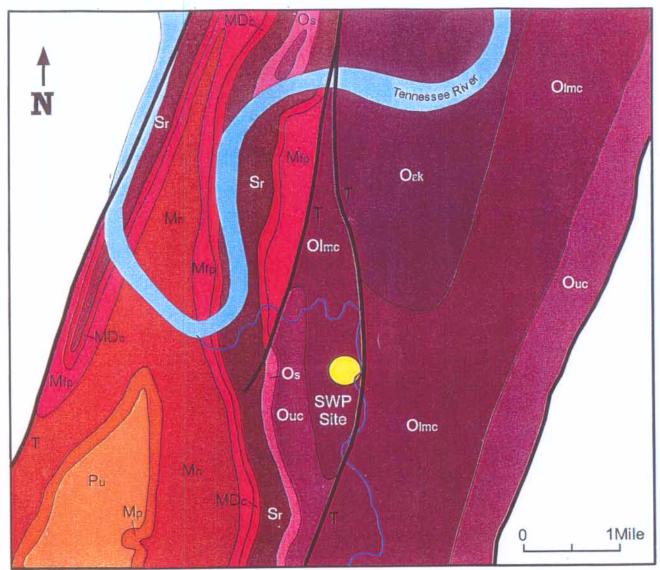
This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map





THIS CHART REPRESENTS DATUM COLLECTED DURING 1948 - 1978.



Modified from Rodgers, 1953

LEGEND

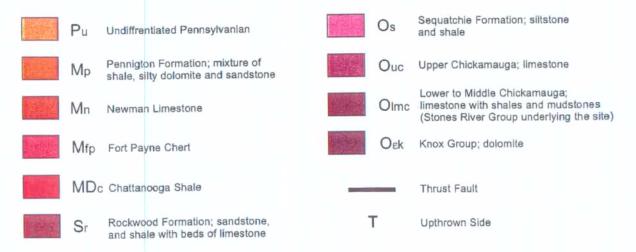
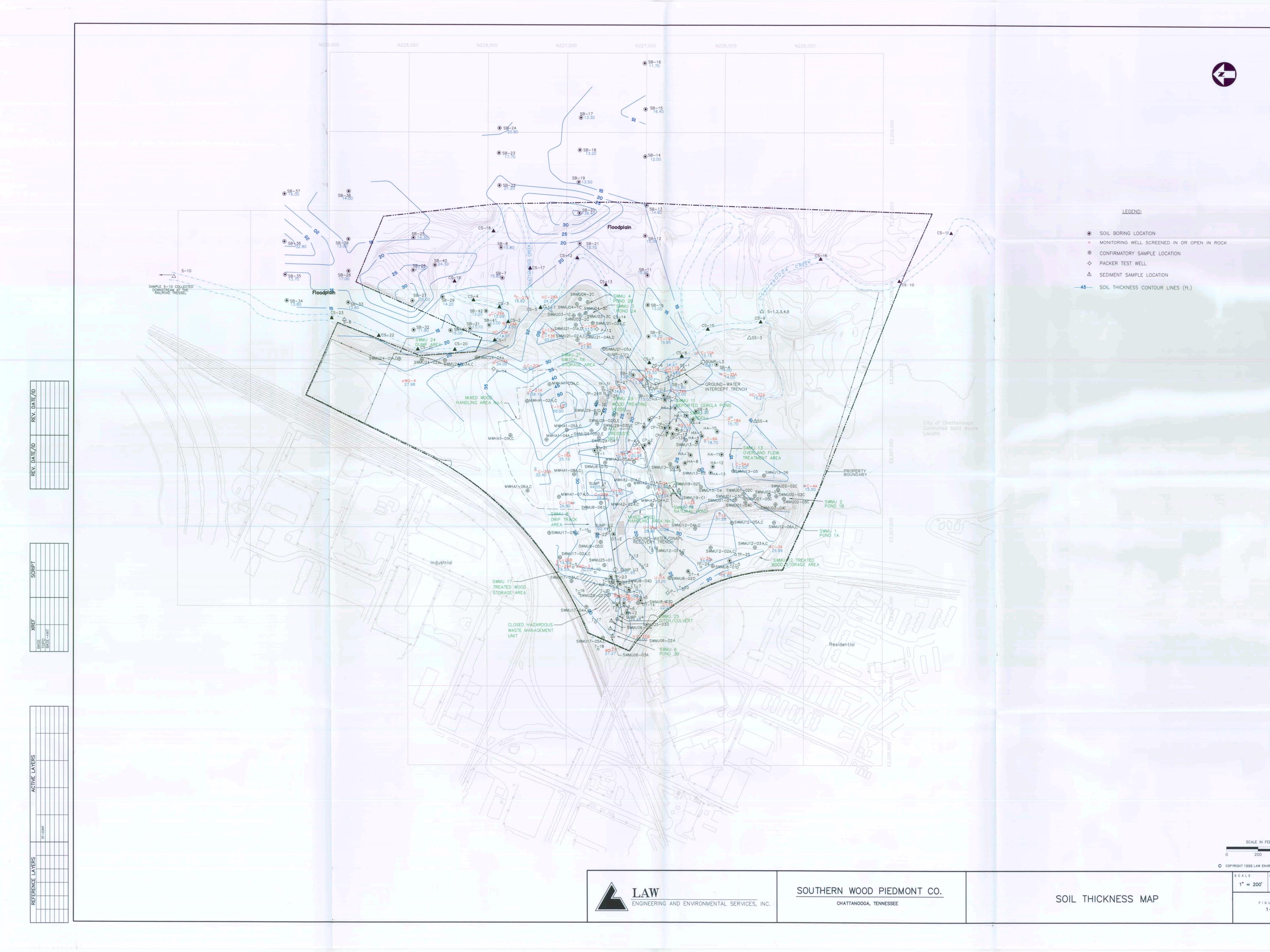
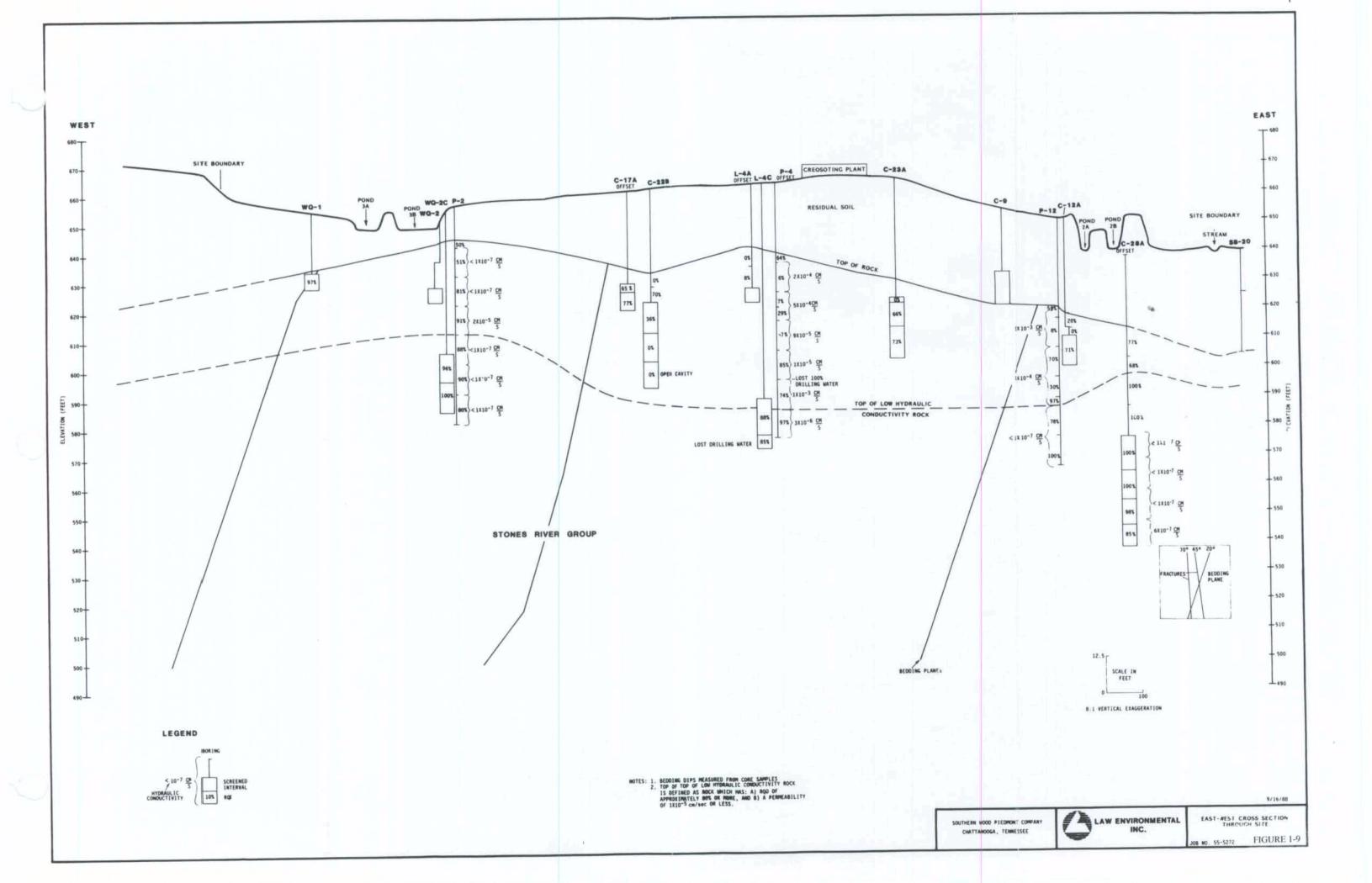


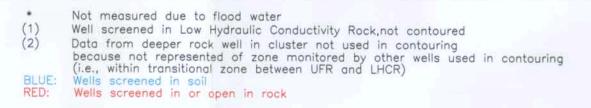
FIGURE 1-6: REGIONAL GEOLOGY OF THE SWP CHATTANOOGA SITE





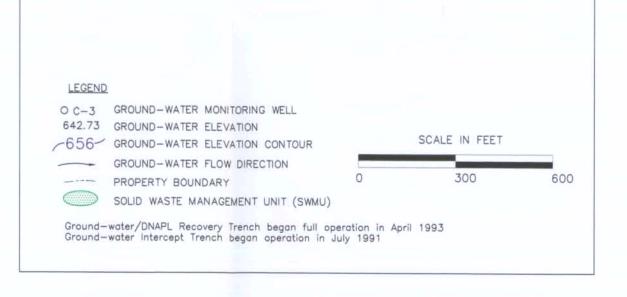


Well	Ground-Water Elevations (ft.)	Ground-Water Elevations (ft.)	Well	Ground—Water Elevations (ft.)	Ground—Water Elevations (ft.
No.	2/23/93	11/03/93	No.	2/23/93	11/03/93
C-1	653.79	650.68	C-1A	653.53	649.56
C-2	655.29	642.73	C-2A (1)	622.66	
C-3	647.37	643.21	0-3A		624.58
C-4			A CONTRACTOR OF THE CONTRACTOR	647.55	643.15
	639.87	639.55	C-4A	639.88	638.79
C-5		637.64	C-5A	•	637.17
C-6		637.47	C-6A	*	635.99
C-7	637.34	632.35	C-7A	635.44	632.08
C-9	637.11	635.27	C-7B	635.74	633.12
C-10	636.85	635.60	C-9A	637.83	635.22
C-11	634.87	633.68	C-10A	637.08	635.16
C-13	637.04	635.26	C-11A	634.99	633.54
C-15	643.37	636.91	C-11B (2)	636.90	635.08
C-16	651.16	644.68	C-12A	636.77	634.98
C-17	658.37	647.59	C-13A	637.10	634.93
C-18	638.41	637.09	C-13B (2)	637.93	636.32
C-21	646.90	639.09	C-14A	635.16	
C-29	658.24	654.74	C-15A		633.59
				643.84	638.16
C-30	656.47	646.52	C-16A	650.18	641.57
C-33	636.44	635.43	C-17A	656.27	645.67
C-34	636.87	632.82	C-18A	640.06	637.63
C-35	637,40	636.01	C-19A	636.02	628.03
			C-20A	637.25	634.20
L-1B	647.15	642.98	C-21A	642.54	638.17
L-2B	640.18	638.78	C-22B	657.53	644.70
L-3B	643.56	638.78	C-23A	642.93	636.50
L-4B	650.22	642.55	C-24A (1)	635.11	633.76
			C-25A (1)	638.97	637.09
S-1B	639.36	636.54	C-26A (1)	638.84	616.04
- 10-		,550.54	C-27A (1)	631.71	622.93
U-1B	653.56	648.64	C-28A (1)	640.33	
U-2B	655.77				601.46
U-3B	649.54	646.45	C-29A	658.46	655.01
		643.18	C-29B (1)	575.12	573.29
U-4B	654.48	646.14	C-30A	656.38	647.82
			C-31B (1) C-32A	661.94 636.38	574.43
WL-1	655.66	651.23	C-33A		635.08
WL-2	659,45	656.35	1 3 5 6 5 7 7 7	636.34	634.60
WL-3	633.84	632.23	C-34A	635.33	632.69
WL-4	632.33	629.29	C-35A	636.95	635.54
			L-1A	647.83	643.22
			L-2A	643.20	640.68
			L-3A	643.12	640.04
			L-3C (2)	642.20	640.08
			L-4A	647.86	646.29
			L-4C (2)	642.68	637.13
		1	L-4D (2)	642.50	637.14
			L-4E (1)	399.66	388.73
			S-1A	638.96	636.41
			U-1A	657.00	
			The state of the s	653.00	647.73
			U-2A	656.12	647.36
			U-2C (2)	654.99	646.97
			U-3A	649.89	643.24
			U-4A	653.21	644.87
			WQ-1	658.88	656.12
			WQ-2	657.40	651.13
			WQ-2B	657.74	651.79
			WQ-3	658.09	654.02
			WQ-4		
			WQ-4 WQ-5	642.37 656.96	635.30 654.74
			UV () "	non yn	654 /4









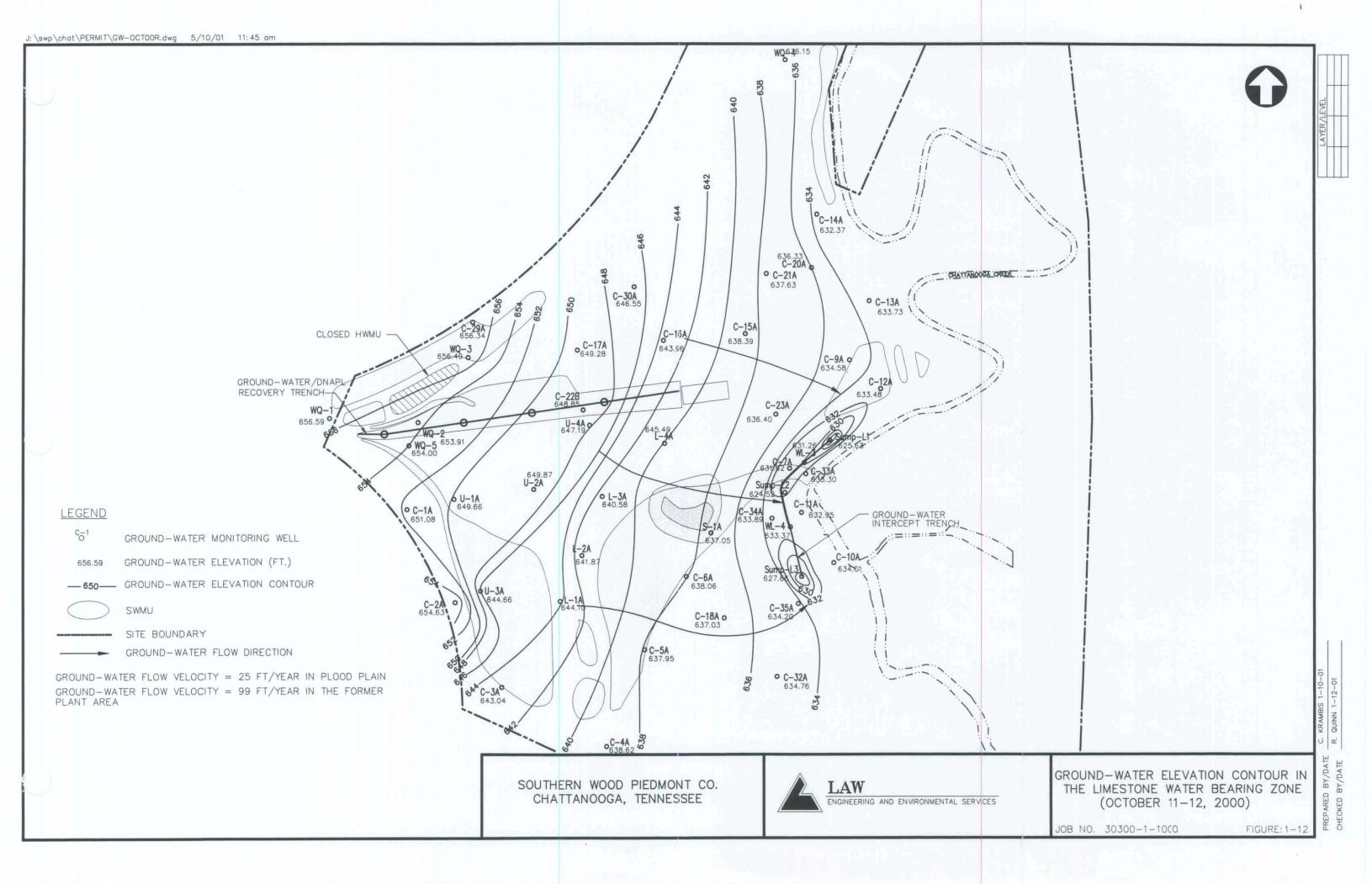


ENGINEERING AND ENVIRONMENTAL SERVICES

SOUTHERN WOOD PIEDMONT CO. CHATTANOOGA, TENNESSEE

REPRESENTATIVE SEASONAL HIGH AND LOW GROUND-WATER ELEVATIONS

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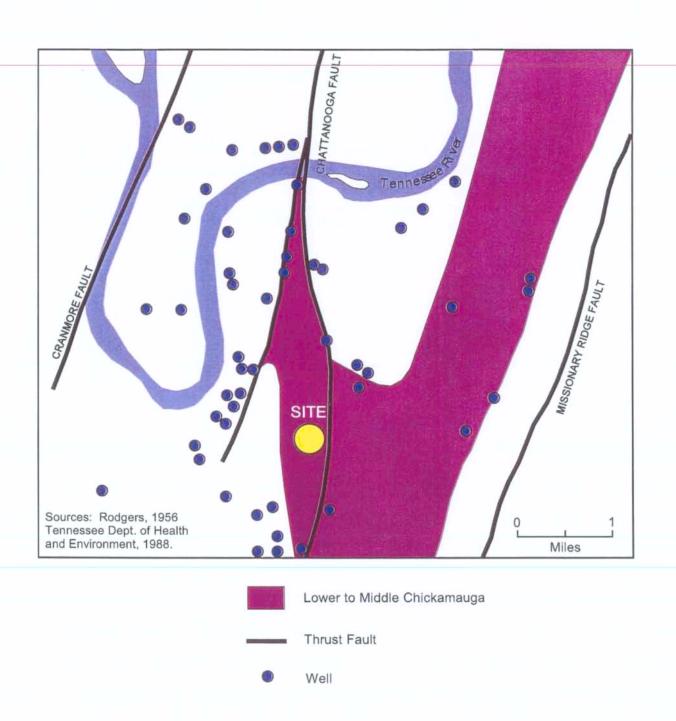
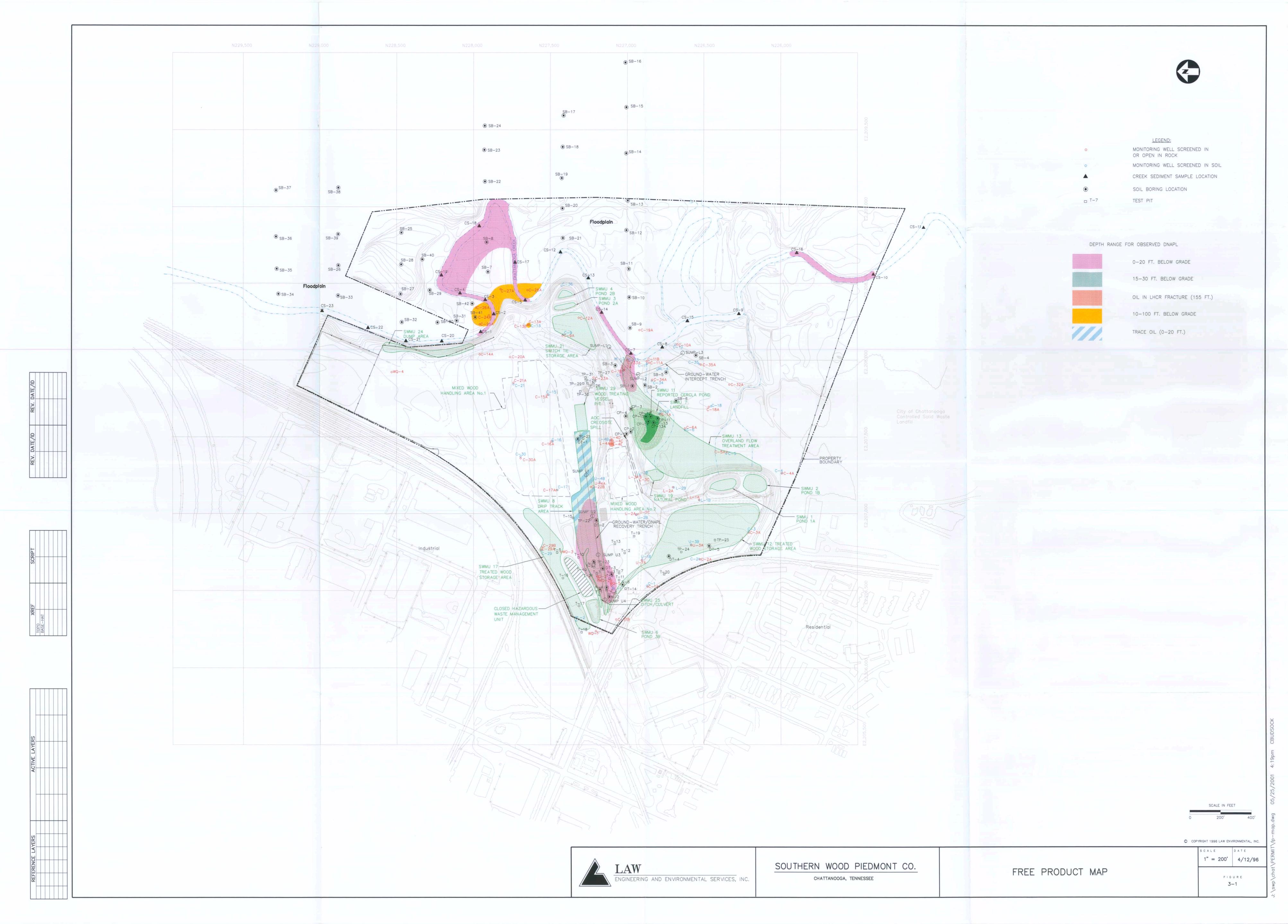
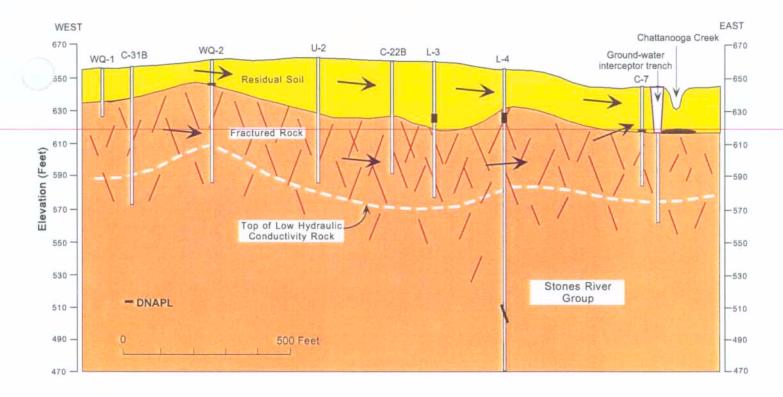


Figure 1-13 Wells surrounding the SWP site area (SWP, 1988).





Geologic cross-section (West-East) through the SWP site (SWP, 1988, updated). Direction of groundwater flow in both the soil and the rock is shown with arrows.

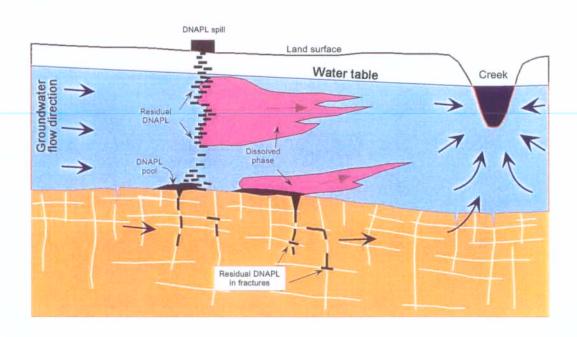
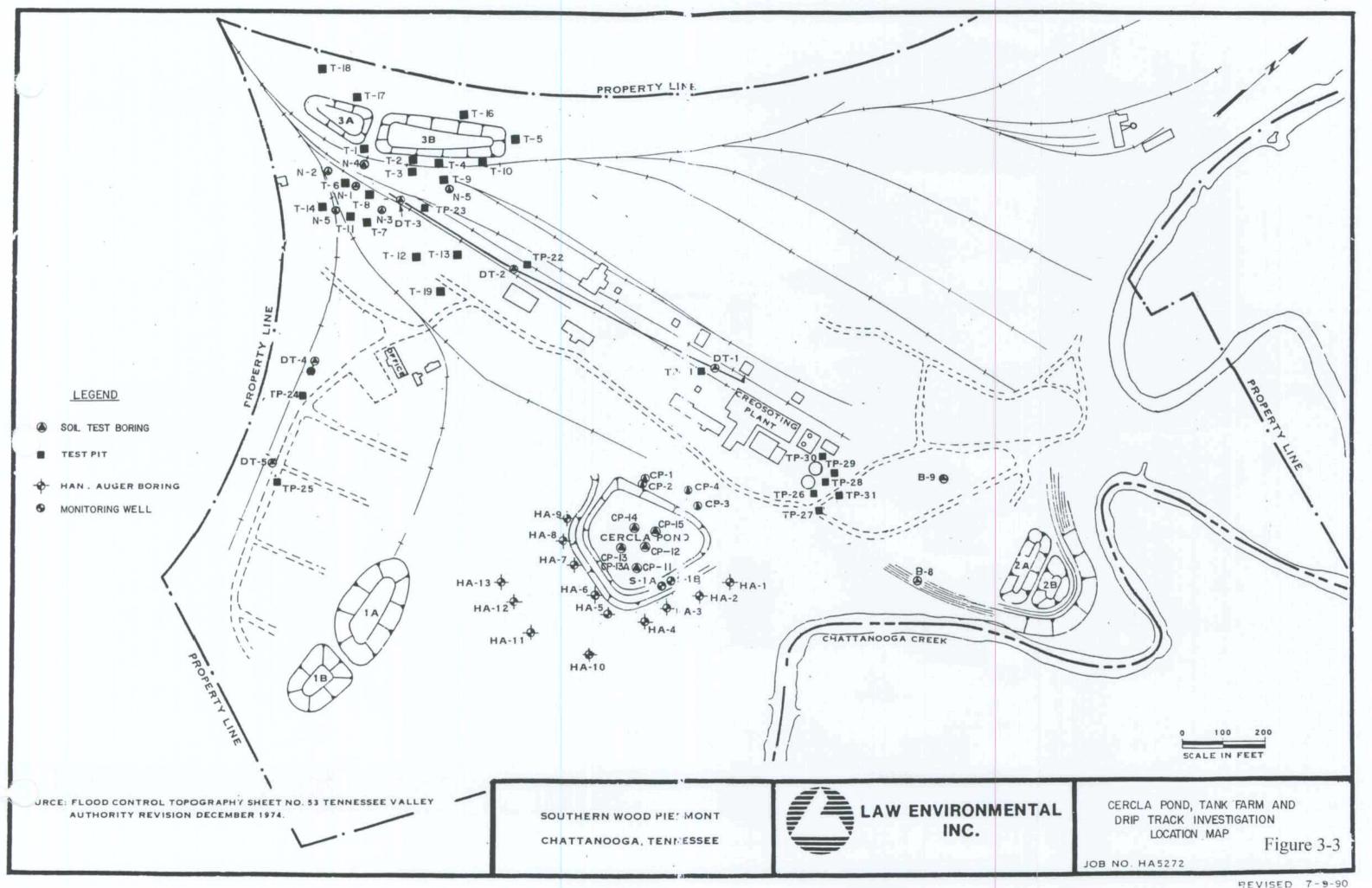
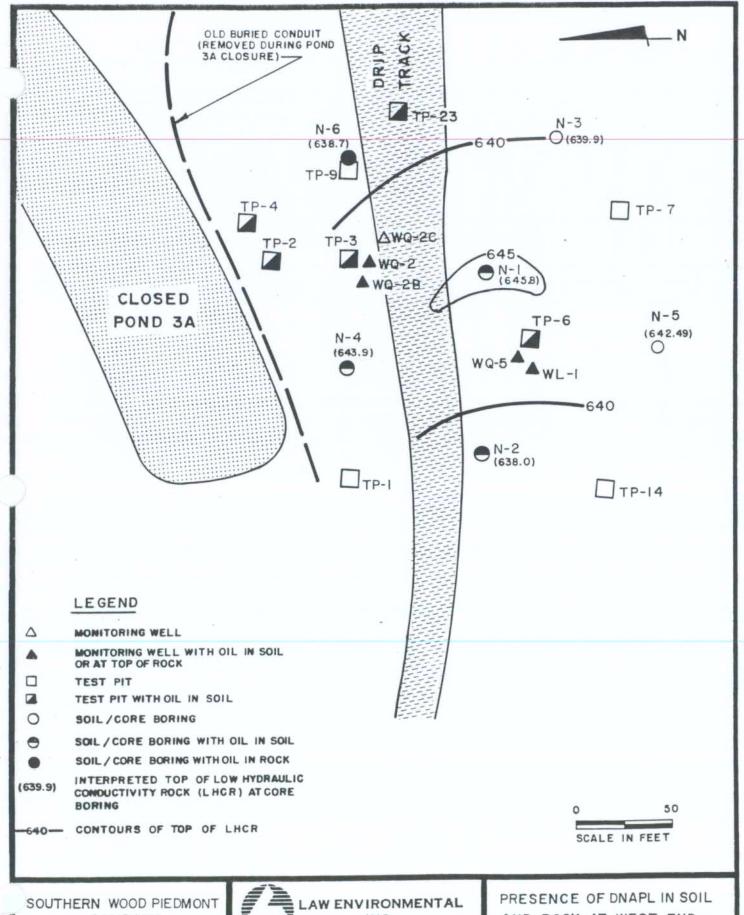


Figure 3- 2 Migration of DNAPL (creosote) and dissolved phase in saturated soil and rock as applied to the SWP site (modified from Pankow and Cherry, 1996).





COMPANY CHATTANOOGA, TENNESSEE



AND ROCK AT WEST END OF DRIP TRACK

JOB NO. 55 - 5272

Figure 3-4

